

SELECT ESSAYS

O N

HUSBANDRY.

Extracted from the MUSEUM RUSTICUM,
and Foreign Essays on AGRICULTURE.

CONTAINING

A Variety of Experiments, all of which have
been found to succeed in *Scotland*.

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SELECT ISSUES

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W H
MUSEUM RUSTI

To the Editors of the M

GENTLEMEN,
THE inclosed trial having been made with great accuracy, I have taken the lib
public,

I am, GENTLEMEN, your

April 23. 1764.

*An Account of the Progreſs of Grain from the Market to the Mouth, by a Trial made
the County of Northamp*

A buſhel of	Bought at	Weight by the market meaſure.	Weight by the ſtandard meaſure.	Surplus above the ſtandard.	When ground into meal.	When dressed into flour.
Wheat,	Kettering,	lb. oz. 61 8	lb. oz. 60 0	lb. oz. 1 8	lb. oz. 58 12	lb. oz. 45 1
Barley,	Harborough,	50 0	48 8	1 8	48 0	39 4
Rye,	Harborough,	56 8	53 0	3 8	52 12	30 14

H E A T.

STICUM, June 1764. No 65.

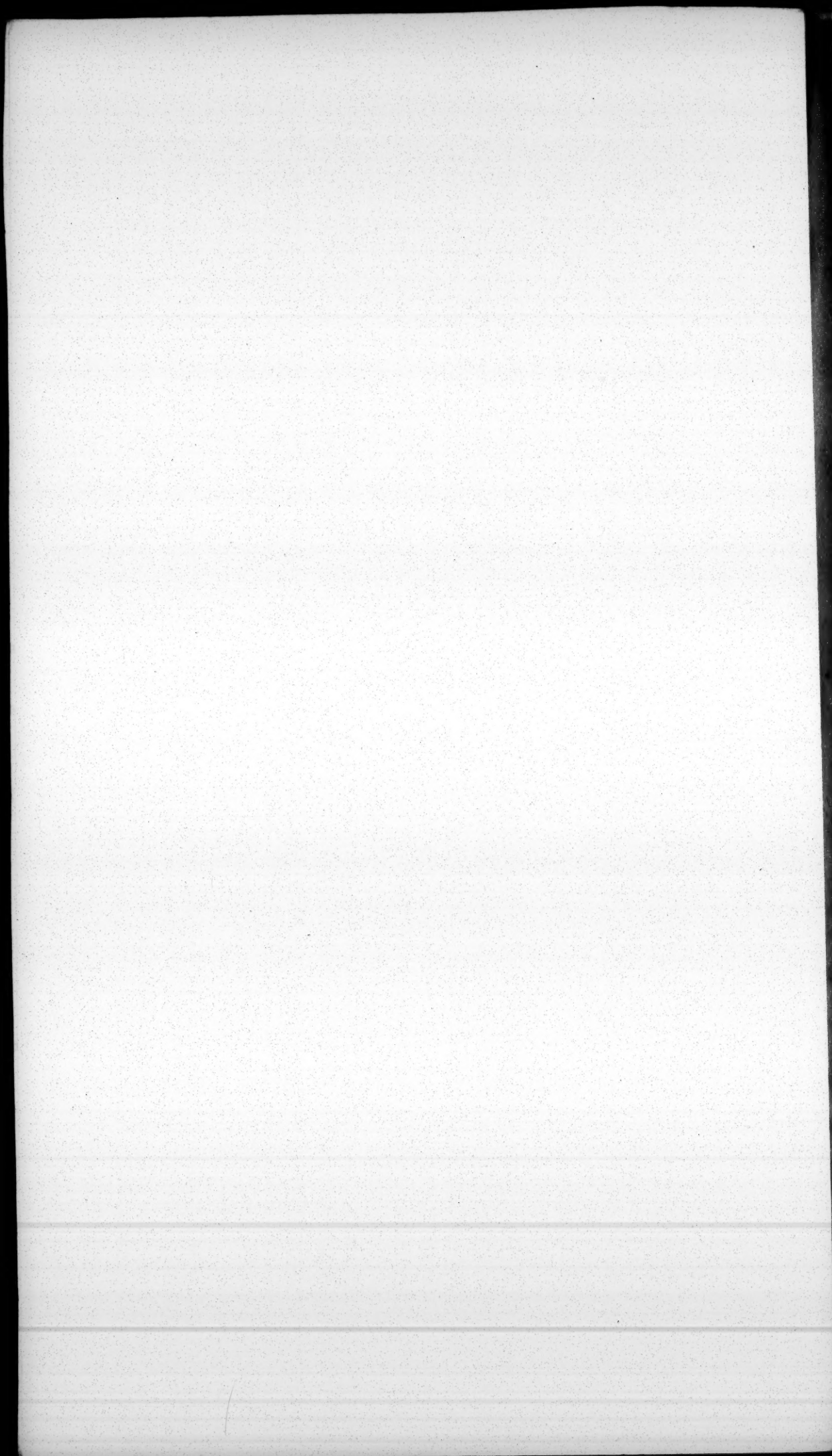
the MUSEUM RUSTICUM.

en the liberty to fend it to you. You may, if you please, communicate it to the
n, your_humble servant,

Y. Z.

al made near Kettering, and exhibited before Four of his Majesty's Justices of the Peace, for
orthampton, August 3. 1757.

When ressed into flour.	Bran.	A bushel of it half made into dough.	Weight of the loaves unbaked.	Weight when baked.
		lb. oz.	lb. oz.	lb. oz.
		Flour 22 8 $\frac{1}{2}$	Four twelve- penny loaves, } 7 4	Four twelve- penny loaves, } 6 9
		Water 9 11 $\frac{1}{2}$	each at	each at
		Barm 0 12		
		Salt 0 4		
		Dough 33 4	29 0	26 4
			Odd weight 4 4	Odd weight 3 0
			33 4	29 4
		Flour 19 10	Two twelve- penny loaves, } 15 0	Two twelve- penny loaves, } 13 15
		Water 11 2	each at	each at
		Barm 1 0		
		Salt 0 4		
		Dough 32 0	30 0	27 15
			Odd weight 2 0	Odd weight 1 15
			32 0	29 15
		Flour 15 7	One twelve- penny loaf } 14 0	One twelve- penny loaf } 13 0
		Water 6 5	One six penny } 7 0	One six penny } 6 0
		Barm 0 12	loaf	loaf
		Salt 0 4		
		Dough 22 12	21 0	19 0
			Odd weight 1 12	Odd weight 1 0
			22 12	20 0



INTRODUCTION.

MUSEUM RUSTICUM, April 1765. No 62.

Reasons why FARMING so often proves unprofitable.

GENTLEMEN,

WHEN I began farming, I was warned from expecting profit, by two different sets of people; First, by gentlemen, who assured me nothing was to be made by it, but much, probably, would be lost, if I had rent to pay; since few, who even farmed their own land, could do more than make their rents, and keep their horses, by their farms.—Secondly, the farmers, who have a mortal antipathy to what they call gentlemen-farmers, and are sure to laugh very wisely at those who pretend to know any thing of the matter, treated my idea of attempting it without *losing* money, as ridiculous.

No great encouragement this to begin; but my inclination to a country-life, and my aversion to the mere idle enjoyment of it, overcame these prudential cautions; and I engaged in farming, with the expectation of, at least, *losing* nothing by it. An indolent practice of business was not my scheme: those who would pursue farming to advantage, should adopt the sentiment of Statius:

——— *Steriles transmisiimus annos,
Hæc ævi mihi prima dies, hæc limina vitæ.*

Whenever the business of husbandry is followed with attention and industry, I am very well convinced it will
A prove

prove profitable, barring particular exceptions : but there is scarce any pursuit in which more money may be lost, through ignorance or negligence.

The rent of a farm is a very material article, though not in this country so often the cause of a want of profit, as commonly imagined.

In some parts of England, I know, the rents are screwed so high, that the tenants are little better situated than day-labourers : but this is not the case in Suffolk ; rent does not bear so hard on the farmer as his standing expences.

Men of tolerable experience, who have seen any parcel of land at different seasons of the year, will judge pretty exactly what rent it is worth ; and, except in very little farms, the property of people in low circumstances, I know but few instances of a want of success, owing merely to the rent.

The reason is frequently thrown on it ; but a near examination generally discovers some bad management, or accidental circumstances, to which a failure may be attributed, as well as a high rent : however, some exceptions there must be to the best-founded assertions.

The stocking a farm is a point of great importance, and requires as much judgment and foresight as any other point in husbandry.

The bad success of great numbers is owing to their not having a sufficient sum of money to begin with, which inevitably involves them in difficulties, and reduces their profit on every article of their produce. Their farms are under-stocked ; they sell at a constant disadvantage ; their fields are not half cultivated ; and in a short series of years, unless some lucky hit sets them up, they grow poor, in spite of all possible industry, judgment, and application.

Even a low and easy rent will seldom remedy the want of money at setting out.

The want of judgment, in proportioning the quantity
of

of each particular kind of stock to the quantity and nature of the lands of a farm, is also attended with great loss.

For instance ; if a farm requires four horses, or two ploughs, and the farmer keeps only three, or a plough and a harrow, his fields cannot be sufficiently cultivated, even according to the ideas of culture common among farmers ; and, of course, in a few years his lands must be in very bad order, to his great annual loss.

On the contrary, to overstock himself with horses, is to keep what will inevitably eat him out of house and home : the expences attending them are very great, and if they are not kept constantly at work, their owner must necessarily lose by them. But it will not be amiss to explain myself more particularly on this head.

I am speaking at present of the practice of farmers, some of whom overstock themselves with horses, without giving their lands extraordinary stirrings on that account. If a farm, which commonly requires three horses, has four kept, and is consequently ploughed and harrowed proportionably more, the farmer will be no loser by his fourth horse ; but the case is very different when he is kept without being worked to the best advantage of the farm.

It is not to be at once perceived how much is lost by not having the number of horses proportioned to the land ; nor can this always be done.

A farmer may find it necessary to keep four horses, and when he has got them, it is a chance but he could perfectly well manage several fields more with them ; and when a man has an opportunity of hiring additional fields, then should his judgment come into play, to take no more than his old stock will manage to advantage, unless he has a sum of money ready to make an addition to it.

The same ill consequences attend either over or understocking a farm with all other cattle : and it would be to the farmer's advantage was he always to remember, that three beasts, of any kind, well fed, pay better than four without their bellies full. On the contrary, not to keep the stock necessary, is to submit to a constant loss. Both these

these sorts of conduct are frequently followed, to the great unprofitableness of farming.

The proportion of the pasture and arable lands of a farm is of great consequence towards the occupier's making a profit of his business.

I have already shewn, in one of my letters, how much more advantageous the former are than the latter; nevertheless many farms have scarcely any grass, and others none at all: the contrary fault, of having too much, never came yet within my observation.

The unprofitable practice of ploughing up pastures, and not laying them down again, which is so universal in this country among farmers, whenever their landlords will allow it, tends perpetually to impoverish them. They are all, to a man, mad after ploughed lands, and would willingly break up every acre of grass in their farms.

So general an opinion among them would make one think the practice really profitable; but the contrary appears beyond all contradiction to be the truth; I mean, according to the culture at present pursued in this country.

Two thirds of the land of a farm in a rich country should be grass; and a little one had better all be so. The vast expences of the plough, without doubt, keep many farmers poor, who, if their farms were grass, would not run half the hazard, and enjoy a much better income.

Particular points of bad management, for want of sense or knowledge, through slovenliness, idleness, or other obstructions to any profitable husbandry, are not what I mean to speak of here, since they are so very various, and so totally ruinous, that no reasoning can be conclusive, unless all such exceptions are made.

The improper quantity of land in a farm is often against the farmer's profit.

Very large tracks, of two or three thousand acres, which are common in Norfolk, are too extensive for one farm. It is impossible for one man to cultivate such a quantity of land well: much of it must be neglected, and but little perfectly managed.

Great

Great profit indeed arises from most of these farms; but they take a very large sum of money to stock and manage them properly.

Very small ones, unless the farmer does the whole business himself, are equally liable to objection. The medium, which is ever, in proportion, the most profitable, is that quantity of land which will admit of being stocked and farmed without the want of either any addition or diminution. What I mean is this:

Let us suppose a farm to consist of seventy acres of land, twenty of them grass, and the rest arable, in a rich country, the land from ten to sixteen and seventeen shillings *per acre*; the occupier must keep one servant, and if he does not work hard himself, one labourer all the year, besides some additional help at busy times.

I know there are many slovenly men, who cultivate (if their management deserves that name) such farms with fewer hands than I have mentioned; but their conduct can be no rule to good farmers. Four horses are also necessary for such a farm *.

Now, for the same standing expences of servants wages, horses, &c. the same number of ploughs, harrows, tumbrils, waggons, &c. &c. one hundred acres, or better, might be farmed with the same proportional profit: in this case, therefore, the tenant of seventy acres loses considerably for want of thirty or forty more. Indeed we seldom meet with a farm nicely proportioned to the stock on it.

There are many very evident reasons why farming should prove unprofitable to gentlemen who undertake to cultivate a part of their estates, whether for their amusement or convenience, or, generally speaking, even for profit.

A very fine Norfolk farm, of a large extent of country, the rent exceeding low, and a gentleman willing to be at the expence of marling, in such a case, there is no fear of considerable profit, even without perpetual attention: but
in

* We are to remember the lands about Bury are light. E.

in common farms, in rich countries, no profit can arise to any gentleman that does not give the business constant attention, and descend to *minutiæ* * ; which may be too disagreeable for him to submit to.

What I mean by profit, is not making the rent, which he might receive from the tenant without trouble, and without hazard, but that additional sum which is the farmer's profit after his rent and all expences are paid. This is scarcely ever made by gentlemen, who farm either for convenience or amusement ; and, excepting grass-grounds, I am persuaded they lose considerably by keeping land in their hands. The plea of growing enough for family-use of wheat, oats, &c. is a mistaken one ; they had better by far buy every article, than have any thing to do with the plough †.

When I am told that farming answers to gentlemen, who I know do not give the *farmer's* attention to the business, I never believe it, or, at least, am persuaded that no regular accounts are kept. It will not be difficult to produce some good reasons for this incredulity.

It should be remembered, that the farms which gentlemen keep in their own hands are seldom above fifty, sixty, seventy, or an hundred a year, and not often so much. It is no easy matter for a farmer, with industry, sobriety, and application, to make above a rent profit in such a farm ; and I believe but seldom so much. This is with every advantage of understanding his business, applying close to it, and doing some work (if his farm is small, a great deal) himself : how unlikely is it therefore that a gentleman, who may probably want these advantages, should make near that profit, or, indeed, any at all !

In

* Matters seemingly of small consequence. E.

† Some gentlemen, who have no objection to their coachman's and their coach-horses ploughing, &c. may certainly keep some arable land in their hands with considerable profit, as all their work is clear gain. But I would, in the above, be understood to mean the unprofitableness arising from their keeping men and horses for that work alone. Y.

In the first place, a principal part of his business, his buying and selling, is transacted by his bailiff, or head-servant, who must be paid for his trouble. He may be lucky enough to meet with an honest one; but I would never advise any one to let the profit of his farming depend on the honesty of other people. Suspicion, to the open generous mind, is irksome and grating: but the farmer should set out with the maxim of Descartes—To doubt of his very existence, and suppose every man a knave till he finds him honest.

But there are many inconveniencies, besides these, in trusting to bailiffs.

The gentleman we must certainly suppose to be ignorant of farming; and he is then, of course, in danger of having an ignorant servant, without the ability of detecting him. However, the single expence of a bailiff, or a *head* servant, which are much the same, is too great to be kept constantly for a small farm; and in their absence the gentleman must depend on himself.

This is palpably no dependence at all; for can it be expected that he will forego his diversions, his excursions of pleasure, the company of his friends, the joys of society, to attend to his farm? I could almost as soon believe, that his wife would renounce an opera or a ball for the pleasure of dancing attendance on her butter and cheese in the dairy. The rural joys of romance are pretty much out of date now; and, alas! there is great difference between the employment of a farmer's wife in England, and keeping sheep on the plains of Arcadia.

Excuse this little digression. To return:

There are, even in a small farm, a thousand objects which require constant attendance.

Cattle of no kind will thrive but in the master's eye: every variation of the season to be remarked; the lucky moment for ploughing, harrowing, sowing, reaping, &c. to be caught, and used with diligence and foresight; fences for ever to be attended to; and, in short, a million of o-
ther

ther things, which require constant thought and endless application.

That single article, the employment of labourers, will alone run away with the profit of the whole farm.

When these points are considered with ever so little attention, surely the opinion I have adopted will not appear unreasonable. The advantages of the farmer over the gentleman will be seen evidently, not enjoyed, indeed, without some desert; for few of the latter, I apprehend, can address their countrymen in the words of Cresinus: *Nec possum vobis ostendere, aut in forum adducere, lucubrationes meas, vigilias, et sudores* *.

But surely it appears plainly, from what I have said, that the unprofitableness of farming is scarcely ever owing to the art itself, but the mistakes of those who practise it.

As I have been so particular in distinguishing several points by which the followers of it lose, I shall now trespass a little longer on your patience, and give my sentiments on the custom of gentlemen's farming, in other respects than that of profit, to those who are not solicitous about it, and, in relation to it, to those whose fortunes will not allow an indifference to such a point.

It is scarcely possible for a gentleman to live in the country without finding many inconveniencies in not keeping a team of farming horses, with waggons, carts, &c. and other implements used in the business of husbandry. While profit is not considered, there will flow a multitude of agreeable circumstances from farming, which will have some relation to almost every particular of a country-life.

In respect of entertainment, what more rational, or more amusing, than country-business, without the anxiety of caring for profit! The public good calls loudly to all gentlemen to keep some land in their hands, that experiments may be made, and modes of agriculture pursued, different from the practice of the neighbourhood, for the farmers, at least, to see that their own customs are not the

* Neither can I shew you, or produce in this court, my constant attention, my watchings, and my bodily labours. I.

the only good ones, and that there are improvements to be made even on *their* practice.

All the improvements and new inventions in agriculture come from gentlemen; scarcely one, that I ever heard of, is known to have been discovered by farmers.

I do not wonder at this, for I think it is natural enough; but, at the same time, it is a strong reason for gentlemen's farming, whether they make profit by it or not. The extensive use of manures, and introducing a garden culture into the field-husbandry, were the effects, among a hundred other instances, of gentlemen's farming.

But if the public good was not to be considered, yet the mere amusement of farming, to a gentleman of fortune, who has the least taste for country-business, must plead warmly for its practice. Such farmers soon make a garden of their estates, at the same time that they improve the value of them.

What can be more amusing than experimental agriculture? trying the cultivation of the new-discovered vegetables, and all the modes of raising the old ones; bringing the earth to the finest pitch of fertility, and growing plants infinitely more vigorous and beautiful than any in the common tillage; using the variety of new machines perpetually invented, and observing their effects; and, in a small extent of ground, seeing the growth of an infinite variety of vegetables, unknown in the common practice; perpetually enjoying the neatness of husbandry, that *simplex munditiis* * of farming which gives the most beautiful colouring to every object around, and pleases the refined imagination with the enchanting prospect of all the elegance of nature.

Those gentlemen of small fortunes, who, if they practice any thing of farming, find it necessary not to be indifferent to profit, have many points to consider.

Such an one should remember, although a farm will afford amusement, it will not yield profit, without application. A constant attention to every article is highly ne-

B

cessary.

* Elegant neatness. I.

cessary. He should keep the exactest accounts, and make memorandums of what knowledge he can pick up. For a few years he must employ a bailiff; and he will find that every day and hour will increase his own knowledge, if he is attentive to the business.

Let him beware of trying experiments from books, except *in small*. It is twenty to one but he loses by them, if he does not begin with little patches of ground, to gain some experience, before he ventures on a whole field. All the work that is possible, he must put out to his workmen *by the piece*; if he employs many by the day, I assert it is impossible to make any thing of farming. Let him, when he begins, apply a sufficient sum of money for that purpose; for he will find it a more expensive business than he may imagine. I repeat it, if he does not keep regular accounts, he will certainly be a loser.

If he has his choice, he should not think of farming less than an hundred a-year, in a rich country.

If these points of advice, and many others which you, gentlemen, and your correspondents, are much more able to give than I am, are followed, no gentleman need be afraid of finding farming a profitable business.

I remain, GENTLEMEN,

Bradfield,
April 2. 1765.

Your constant reader,
Y.

On

On the FOOD of PLANTS,

FOREIGN ESSAYS, April 1765. Article 25.

To the AUTHORS of the Foreign Essays on Agriculture and Arts.

GENTLEMEN,

VARIOUS have been the opinions respecting the nourishment extracted by plants from the earth; some asserting that all plants require the same food, and that there is only one nutritive juice which equally serves for them all, being secreted, modified, and adapted to the nature of each plant by means of certain organs contained in its structure.

Others, on the contrary, say, that every plant requires a particular food, and that when one plant has extracted from the earth all the nourishment it requires, and which is adapted to its nature, the ground is not the less proper for affording nourishment and support to some other plant of a different genus.

I do not by any means pretend to judge which of these opinions is most reconcileable to nature and reason, tho' I have been long a practical husbandman in one of our North American Plantations: the truth is, these are inquiries which do not immediately attract the attention of the farmer, and it is only since I have been retired from business, and settled in this metropolis, that I have at all attended to such researches, which, though curious, have yet their use.

As you invite gentlemen to correspond with you, and send you pieces for insertion, I have taken the liberty of recommending to your notice a piece written on this subject by the celebrated Mons. du Hamel; and shall next month, if you approve of it, send you a most curious piece on the same subject, written by Mr. Engel of Switzerland.

I shall not at present take up more of your time, except to assure you that I am a well-wisher to your work, and, Gentlemen, your very humble servant.

London, March 2. 1765.

R. BRENNAN.

An Essay on the question, Whether the several Kinds of Plants require the same Nourishment? by Monsieur DU HAMEL.

TO take this matter in a general sense, it does not seem probable that the same matter can supply with food such a number of plants, differing one from the other in appearance, in form, smell, taste, and even in their properties, for it is not to be doubted but the internal parts of plants differ much one from the other.

But we must not thence conclude that the nutritive juices differ whilst in the earth, previous to their being modified by the organs of the plants. In reflecting that plants rob one another of nourishment, by means of the roots they extend in the earth, we are under a necessity of admitting that the first nutritive juices are homogeneous.

It might indeed be urged, that as water enters largely into the composition of the sap proper for all plants; and as it is, at least, a vehicle necessary to dissolve the other constituent parts of the sap: this vehicle, necessary to all plants, being absorbed by some plants, those remaining, must, of course, suffer, as the other constituent parts of the sap could not any longer be divided and dissolved as much as was necessary, to enable them to enter these plants. But something yet more explanatory may be added; if, for instance, a lettuce required any different food from that which supplies endive with nourishment, this lettuce planted with endive would thrive better than if planted among other lettuces; however, experience convinces us to the contrary. It is then certain that plants of different kinds rob each other of their food; and it seems as if this extended farther than the aqueous vehicle; besides, it can be made appear, that the same juice,
imbibed

imbibed by different plants, assumes various qualities. For instance, having taken a lemon of the size of a pea, and grafted it by the stalk on the branch of an orange-tree, it there throve, ripened, and still preserved its quality of a lemon, without partaking in any thing of the orange: this incontestably proves, that the juices of the orange-tree received a different modification on entering unto the organs of the lemon. All grafts prove the same thing.

Not content with thinking there were different saps for the nourishment of every plant, some would have it, that there were in every sap particular juices to form every part of the same plant, or the same fruit. What a difference is there betwixt the flesh of a peach, the shell of its stone, the substance of its kernel? &c. It was, therefore, thought necessary, that it should have as many particular and distinct juices for the nourishment of each part.

It seems to me very probable, that the organs of plants so modify the sap as to give a different flavour to fruits, and form the different parts of the same fruit; for with ever so much attention, no traces can be found either of the flavour or the smell of a root, in the earth that surrounds it; and in chewing the leaves and young branches, there is often perceived a total want of any thing analogous to the flavour, or the smell of their juicy and aromatic fruits.

Should any one ask me how the same sap can serve for the formation and nourishment of the shell of the stone, the skin of the kernel, and the flesh of a peach? I would, in return, ask the most able anatomist, how the chyle, which is the sap of animals, can form the substance of the brain, the nerves, the membranes, the flesh, the bones, the nails? &c. These operations depend on a mechanism so refined and delicate, that it has escaped the researches of the most celebrated naturalists.

Mariotte imagined, that in plants, this operation was performed in the roots; but by grafts, and many other observations, it is fully proved, that the organs capable of giving a modification to the sap, exist in all the parts of plants; and if we sometimes meet with imperfect peaches,
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which taste of the leaves of the tree, it is most natural to attribute it to a depravity of the organs destined to give a new preparation of the sap which was to enter the fruit.

It is true, that particular tastes are found in fruits, which seem to proceed from the earth in which the trees are planted, and which, on that account is called the taste of the soil; but these tastes, peculiar to certain soils, are equally met with in all the different kinds of fruit which grew in that same soil. Thence, I conclude, that there are certain juices, the taste of which is not to be altered by the organs of vegetables; but this observation proves, that they are indifferently infectious to different plants, and that they mix with the nutritive juice, still preserving something of their original character.

The same thing is observable in the animal kingdom. I have eat, at the late M. de Reaumur's, chickens, the flesh of which smelt of garlick; because they had mixed that plant with their food. In like manner, a rabbit, which had been fed at M. de Malesherbe's with nothing but sage, had its flesh strongly scented with the odour of that plant.

We may add, that madder, mixed with the food of different animals, renders the bones, that are formed in the time it is used, of a very beautiful red colour. But these exceptions should be no obstacle to our concluding, in general, that aliments change their nature in the internal parts of animals and vegetables; to form, in the last, wood, bark, and the substance of fruits, &c. and in animals, flesh, tendons, bones, &c.

It is true, we cannot boast of having a perfect knowledge of any part of vegetables; but Grew, Malpighi, myself, and, I venture to say, all the naturalists have found on the surface of the roots only a spongy substance, which seemed indifferently disposed to imbibe every kind of juice which presented itself.

If this is the fact, the juices must receive their qualities in the internal parts of plants; and what makes this opinion the more probable is, that I have raised, in very clear

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and very pure water, capillary plants, bulbous flowers, different kinds of pulse, and even trees ; these plants have found, in this very pure water, wherewithal to furnish themselves with the lively smell of balm, the sweet taste of the bean, the acrimony of the oak, the bitterness of the almond, and the viscosity of the buds of the horse chestnut-tree ; and, by a chemical analysis, these plants yielded the same extracts as those that were raised in the earth.

Tho' the knowledge we have of the mouths of the pores of roots is very contracted, yet it is possible to prove, that these roots indifferently imbibe juices of very opposite qualities. By a chemical analysis, nitrous salts, vitriolic salts, and sea-salt, are extracted from plants. It is not at all probable these three mineral acids should have been formed in the plants.

I have, besides, put the roots only, of young plants, into tinged or scented liquids, and have met with manifest traces of these liquids, even in the leaves and fruit. Some have also been of opinion that every thing capable of being dissolved by water indifferently finds a passage into plants ; and this, with a few restrictions, may be admitted. But they have farther imagined, that each plant appropriated to its use only such parts as were proper for its nourishment, the rest passing off by transpiration: it is this point that cannot be allowed ; for all that have examined the transpiration of plants, could perceive nothing in it but a pure phlegmatic matter.

It is necessary to remark, that, by admitting plants only to appropriate to themselves what is necessary, it would of course follow, that the earth would be as much impoverished, as if all plants were fed with the same juice ; for, as the transpiration mingles with the air, and is dispersed at large, it cannot well be said to fall again on the earth which produced it, and that this earth is fertilized by it.

An objection might be made to the identity of the nutritive juices of plants, by remarking, that certain soils seem more proper than others for the growth of certain kinds

kinds of plants : one soil is proper for rye, another for wheat, this for meadows, that for artificial pastures, &c. ; and the reason for this conclusion is, because the nutritive juices of these plants are found there in greater plenty than elsewhere. I do not controvert this observation ; but does this depend on the nature of the juices contained in the earth? or, may it not be attributed to another cause?

To oppose one observation to another, I shall remark that, in all appearance, the same earth can afford nourishment to every kind of plant. Thyme, which commonly likes a dry soil, will thrive, if planted in the earth of a marsh carried to the top of a hill ; in like manner, a tuft of rushes will thrive in earth taken from the same hill, provided it is carried into a marsh. It does not then, in this case, proceed from the nature of the earth that thyme grows naturally on the hill, and the rush in the marsh ; but because the rush requires more water than the thyme, which would perish in too moist a soil.

This may be carried farther. Botanists know that all plants, not only of our Temperate Zone, but also of the Frigid and Torrid Zones, live in the earth of our climate, provided they are so situated as to enjoy a degree of heat and moisture suited to their constitution. This being premised, good earth appears to agree with all vegetables ; and, in fact, the plants we meet with in a bad soil, grow with an uncommon vigour, when found in fertile land.

We may add, that plants which bear largely, have occasion for a greater depth of good earth. That which is only six inches deep, may afford nourishment to plants whose roots extend not very far in the earth, such as almost all annuals. But this depth of earth will not be capable of affording sufficient nourishment to lucerne, much less to trees.

This, and other the like circumstances, may be the cause that certain plants thrive better in certain soils than others, without attributing it to any essential influence which can proceed from the nature of the juices contained in the earth.

In order to support the heterogeneity of the nutritive juices of different plants, it is farther remarked, that, if a tree dies, in any spot, of age, another tree of the same kind being planted there seldom succeeds; and that it is more proper to plant a tree of a different kind; because, say they, the earth is exhausted of the juices proper for the sort of tree that died of age; but contains others proper for the nourishment of trees of a different species.

I allow that the difference of the nutritive juices furnishes a very natural explanation to this observation; nevertheless, many other causes might be assigned. The tree which is supposed to die of age, may have died thro' some particular defect of the soil, by means of some insect's having destroyed its roots; or, perhaps, of a decay, caused by its being drained of its sap by some parasite plant, which has secretly robbed it: it may even turn out, that the rotting of the roots of this old tree, or certain secretions which the earth may have imbibed, have rendered this soil unfavourable to that species of tree only.

But to continue our relation of the facts which seem to favour the heterogeneity of the nutritive juices of plants. All farmers agree in thinking that it is best to sow successively in the same land different seeds; such as wheat, barley, oats, peas, millet, turneps, &c. by this change, they can have successive crops from the same land, which they could not have, if they always cultivated the same kind of grain.

After being convinced of this fact, I shall remark, that if barley succeeded well after wheat, only because the earth had retained the kind of juice proper for the nourishment of barley, it would follow, that a good crop of wheat sown on a barley-stubble might be expected, as the barley would not have devoured the juices proper for the wheat. Nevertheless, the crop of wheat would, for the most part, be bad; because wheat does not succeed, unless the land has been prepared by three or four good plowings: on the contrary, barley, which is less delicate, and requires not so much nourishment, succeeds tolerably well in a field

that has had but two plowings. But this barley would give most amazing crops, if sown on land prepared as for wheat.

It may be added, that if every plant only drew from land the juices adapted to its species, the year of fallow might be omitted, and the first year wheat might be sown, the second barley, the third oats, then buck-wheat, peas, maize, millet, &c. It must be allowed that by this method, continued without interruption for a number of years, but very weak crops would be got, the year of fallow being necessary to give the land the plowings requisite to divide its parts and kill the weeds.

Another observation is made to prove, that plants of different kinds require not the same nutritive juice, which is, that a poor land left untilld, and suffered to cover itself with grass, at the end of a few years so far recovers itself as to be in a condition of yielding tolerable crops. In like manner, good crops are had from either natural or artificial pastures, newly broke up, without the help of manures. These lands, say they, instead of being exhausted by the grass they produced, resemble fresh earth.

If corn succeeds well in pastures broke up, it is probably because the grass, being nourished by the surface of the land only, the inferior earth remains unimpoverished, being even meliorated by the rotted leaves and roots. Saintfoin and lucerne should be excepted from this rule, as they push their roots far into land; and, perhaps, as they seek their food at a great depth, they do not exhaust the surface. On the contrary, they enrich the land by their leaves, which rot; and this enriched surface is sufficient for the growth of annual plants.

The most natural conclusion to be drawn from these observations, is, that plants do not render the earth barren, and that they never injure each other, unless it is during their growth; and if they do it then, it is, perhaps, by consuming the moisture, which is the chief vehicle of their nourishment. It is, probably, on this account that trees
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are killed when faintfoin is sown on the land in which they extend their roots.

We may say, with Mariotte, that the principles of which every plant is composed, are the same, at least with respect to such principles as are most obvious to our senses. If they have others peculiar to each plant, it is not in our power to separate and demonstrate them apart.

To prove this proposition by an experiment: Take a garden-pot with seven or eight pounds of earth in it, and sow therein any plant you please, it will find in this earth, and the rain-water used to water it, all the principles proper for its nourishment. When it has attained its full growth, let the earth of the pot be stirred, and sow another kind of plant, watering with rain-water as you did the first, and it will thrive; and in this same earth you may raise as many roots of plants as you please. But if the salts, oils, earths, &c. of every one of these kinds differed from each other, it would be necessary that all these principles should exist in this small quantity of earth, and the rain-water used to water it; yet this is impossible. For tho' each of the plants raised in the pot should yield but one drachm of fixed salt, two drachms of earth, &c. all these principles, mixed with their distilled water and their oil, would weigh at least two or three ounces; which, being multiplied by the number of the plants supposed to be successively raised in the earth of this pot, would amount to much more than the weight of the earth in the pot.

After the experiments and observations I have related, I must forbear making any positive conclusion on the nature of the nutritive juice of plants; and, notwithstanding the success of my experiments on the vegetation of plants in pure water, I am apt to think, with Mariotte, that the juices imbibed by plants are not so pure a water as that which I employed. It may, perhaps, be the same with regard to these plants as with certain fishes, which live for a long time in the most pure water, but grow thin, and would in the end die if other food was not given them. Our experiments will, at least, undeceive such as think
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this vegetative virtue depends on a pretended nitre, which many authors have taken occasion to mention.

With respect to the preparation liquids receive in the internal parts of plants, there is not the least doubt but they depend on so refined a mechanism, that it has hitherto escaped our researches. Neither is this matter of surprise, since the same question, with respect to animals, remains as yet undecided, notwithstanding the researches of the most celebrated anatomists.

What we have said relative to the nutritive juice of plants, may induce us to be of opinion,

I. That many plants of different kinds are fed by nearly the same substance.

II. That there is no plant but what robs of food all within its reach.

III. That a soil once adapted to one kind of plant will always be in a condition to supply it with food, provided it is properly cultivated.

On the FOOD of PLANTS,

FOREIGN ESSAYS, May 1765. Article 35.

To the AUTHORS of the Foreign Essays on Agriculture and Arts.

GENTLEMEN,

I Now mean to fulfill the promise I made you in my last letter by enclosing a curious essay written by Mr. Engel, of Switzerland, on the famous question of the nourishment of plants by the same, or by various kinds of sap. I beg leave to recommend this to your notice, and request that you will afford it a place in your work as soon as you conveniently can.

I am, Gentlemen,

London, April 16.
1765.

Your very humble Servant,
R. BRENNAN.

An

An Essay on the Question, Whether all plants extract from the earth the same nutritive juices? Written by Mr. ENGEL, President of a Committee of the Oeconomical Society at Berne.

EUROPE, astonished at the immense trade of the English, at their successes, their power, and their wealth, has at length inquired into the cause of this superiority, and it was immediately discovered, that this prosperity was chiefly owing to the encouragements given to agriculture in all the three kingdoms.

Some zealous citizens, either separate or united in societies, have applied themselves to the study of the principles of this most useful art. The government, the parliaments have protected them by regulations, and encouraged them by rewards; and these united efforts have secured to this nation advantages which are greater, more certain, and more lasting, than those derived from the mines of Peru.

Other nations, encouraged by this example, were willing to come in for a share of these advantages. Academies were in every part established, and we had the pleasure of seeing learned, curious, and industrious men, who, supported and encouraged by the princes and magistrates, made experiments, proposed schemes, and established rules for extracting from the earth, our common mother, every kind of production. And these philosophical husbandmen have been the rather induced to write on these subjects, by the delicacy of their sentiments, perceiving the advantages that would result to mankind in general from their endeavours; and they moreover continually find, in the study of nature, reasons for exalting the infinite wisdom of the Creator, and a variety of knowledge capable of satisfying their extensive desires.

It may easily be conceived how vast the field is, from the questions which have been published by our society.

One of these questions is indeed of the last importance, though intelligent husbandmen are much divided in their opinions relative to it. The question is, Whether all plants require

require the same kinds of juices, of salts, of food ; or whether each is nourished by a different substance ?

Mr. Du Hamel, who puts this question, gives no positive answer to it ; others are for the affirmative, many for the negative.

I will not venture absolutely to decide in this matter. I shall content myself with proposing my doubts, leaving my observations to be examined and judged of by the intelligent reader.

Be it as it may, the negative appears to me most consistent with experience ; and I think I have observed, that a soil which is exhausted of the nourishment adapted to certain plants, is not so with respect to others.

I shall begin with laying down a few principles.

FIRST PRINCIPLE. The ancients have established four elements, fire, air, water, and earth. Des Cartes proposed three others, which, on account of their novelty, were at first received, but were soon afterwards dropped.

Chemists who are employed in searching for the elements or principles of which various bodies are compounded, have in general specified three, namely, salt, sulphur, and mercury. Others have added two more, phlegma and caput mortuum, which last some call earth.

Others again exclude mercury, which they say is nothing more than dilated sulphur.

We know what is meant by salt. As for sulphur, they mean by it the oily and phlogistic or inflammable particles. By mercury they mean the spirituous particles. I do not see how these two last principles can be confounded and identified ; they rather appear to be opposite. In analysis, the spirit and the oil do not mix, but always remain separate. The phlegma is pure water divested of all the other elements ; and the caput mortuum is an earth divested of and detached from all the other principles.

Such as admit of only three principles, and the others who allow of five, appear to me to differ only in expression. The three first are the only active principles, the two last being merely passive.

If then we will admit into the rank of chemical principles only active and efficient causes, there will be but three ; but if we reflect that every agent is useless unless it has some recipient, some passive substance on which it may act, we must acknowledge, that the two passive principles are as necessary as the others, and equally merit a place amongst the elements.

SECOND PRINCIPLE. There is undoubtedly a very great analogy between animals and plants. Formerly the animal was thought to be as far removed from the vegetable kingdom, as this last is from that of minerals.

For a long series of time what was said relative to the palm or date-tree was esteemed a fable, namely, That there was a male and female, and that the assistance of the male was necessary to fecundate the female. How were they ridiculed who first discoursed of the fecundation of plants by the dust of the male flowers ? but at present nobody entertains the least doubt of it.

The celebrated Linnæus points out to us an infinite number of different sexes more amongst plants than amongst animals. He describes their various constructions, he shews their farina fecundans, their ova, their receptacula, &c. insomuch that it can henceforth never be denied, but that there is a great resemblance between animals and vegetables. This is a principle of which we should never lose sight.

THIRD PRINCIPLE. There is an infinite variety amongst plants ; they all differ much in their structure and in their composition. The stems are more or less succulent and soft, hard and ligneous, compact and porous, pliant and stiff. The fruits vary in shape, taste, smell, and colour ; the leaves are also very various. The diversity is still greater in the flowers, where all imaginable colours, shades, and mixtures are seen. The juices in the plants are not less different : We find many of them wholesome, others hurtful, and some even poisonous. In some plants vitriol predominates, in others nitre, in some sulphur, in others

others salt. Some again contain all these various principles in a more equal proportion.

FOURTH PRINCIPLE. Nitre and nitrous particles contribute much to the fertilization of the earth.

I am sensible that this principle is not universally adopted. There are naturalists who assert, that all salts being composed of sharp and cutting particles, and being very susceptible of moisture, in no sort contribute to vegetation, but by dividing, dilating, opening, breaking, and stirring the earthly particles, and insinuating themselves into the pores of the earth.

Others go still farther, and contend that nitre, and particularly common salt, rather contribute to make land barren than fruitful. An effect, say they, so well known by the ancients, that when any town was marked out for destruction, they razed it, plowed up the ground it stood on, and sowed it with salt; giving us thereby to understand, that the spot was neither to be inhabited nor cultivated, and that it was not for the future to bear even a plant.

In these various opinions we find both true and false positions; we will endeavour to distinguish them.

In the first place it is certain, that nitre used in excess is prejudicial to plants.

The garden belonging to the castle of A. is a terras, and the castle itself stands on a still higher terras. At the end of one of the wings, where the stable is situated, is a border. This stable, though it is often cleared, abounds always with salt-petre, which descends and penetrates into the earth.

Though this border was in a fine exposure, nothing would thrive in it. I caused the earth to be taken away, and some fresh mould to be put in the stead of it. The plants then prospered very well in it. Two years afterwards they all died, on account of the nitrous particles which were now found there in too great plenty.

Another experiment. I caused some pots to be filled with mould, which I imagined very good; the plants I
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put in them languished and died. I was intirely ignorant of the cause, till having watered them several times, I perceived glittering on the sides of the pots exposed to the heat of the sun, crystalized particles of nitre.

By this it is evident, that nitre is sometimes an enemy to vegetation; and we must not be surpris'd at it.

All manures, even those that are best adapted to promote fertility, as dung, parts of animals, &c. which assist vegetation in so remarkable a degree, when they are used in proper quantities, are nevertheless very prejudicial when used in excess.

I have somewhere read, that a certain gardener had in his ground a monstrous cabbage, which rais'd admiration in every one who saw it. They could not conceive by what means it attained so extraordinary a size, till in digging the ground, they found that the root had fixed itself in an old shoe.

I am also acquainted with some meadows, which are frequently by art flooded by the waters of a brook which washes the town slaughter-house. These meadows yield so large a quantity of hay, that the like was never before seen in any other part of the country.

Every fourth year the hay grows coarse, having hard stalks, which greatly lessen the value of the fodder, inasmuch that the owners are obliged to plow up these meadows, and sow them for three successive years, in order to abate their rankness. After this the hay is again fine, of a good quality, and amazingly plentiful.

As to nitre in particular, I have frequently used it with success, and it greatly promotes the vegetation of plants, if it is applied with caution.

From these collected facts I conclude, that nitre is useful or prejudicial according to the application that is made of it.

But we must guard against mistakes; for common salt has not the same qualities as nitre, and does not in so great a degree assist vegetation. Common salt, as well as all other salts, if they are properly applied, loosen and separate

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the particles of the earth, so as to adapt it to the reception of vegetables. But nitre, sea-salt, and all salts in proportion as they participate the qualities of nitre, have a neutral salt in their substance, which contains not only an acid but an alkali, together with a phlogistic or inflammable oil, and a fine invisible and impalpable earth, which serves as food for plants, and to which water serves as a vehicle to convey it into the pores of plants.

It is this matter which renders manures from the animal kingdom superior to all others.

Some may imagine no earth can be invisible; what can be clearer than the chrystaline water of a fine spring? It has however been demonstrated, by numberless experiments, that it contains this earth, which is the principle of all vegetation; it was therefore invisible in this water which was so clear and limpid.

FIFTH PRINCIPLE. The chemists extract from all material beings, salts, oil, and a spirit, which are the active principles of corporeal substances; but we may observe at the same time an astonishing difference in the taste, the nature, the properties, and the effects, of these principles; yet how few are they, in comparison to what we are ignorant of?

I have not the least doubt, but that there is among these salts, oils, and spirits, as great a variety as there is amongst the different kinds of animals, and even of plants; these are however unfathomable depths, which as frequently occur in agriculture as any other science.

We will now come more immediately to the matter in debate.

Hitherto it may easily be perceived, that I incline more to the opinion of those who imagine that every plant requires a different nourishment, than to that of those who conceive that they are all nourished by the same food.

No thesis on this, or indeed any subject, should be positively and exclusively supported against all other reasoning. I admit of exceptions, restrictions, and distinctions. The opinion I am most inclined to favour, is that advanced

ced by Mr Home, in his Principles of Vegetation, and that which I controvert, is the same which Mr Du Hamel seems most to approve of.

The third and fifth principles appear to me to demonstrate, that there should be a real difference betwixt the food of different plants, which vary much in their real and accidental parts, in their salts, their oils, and their spirits, and, in a word, in their very essence.

By the second principle it is incontestable, that as there is a visible analogy betwixt animals and vegetables, the nourishment of vegetables must of course be more different than is that of animals. Some animals are carnivorous, others eat seeds, fruits, and roots; many feed on grass, and what a difference is there even amongst these last?

Horses, oxen, sheep, asses, and goats, in general live on the same food; but it has been remarked, that some eat with eagerness those plants which others refuse, and that certain plants which are poisonous and injurious to some animals, are wholesome and palatable to others.

Some will feed on any thing. Hogs eat flesh, blood, fruits, corn, and grass; they refuse nothing.

I imagine it is the same with plants. Some not being very delicate indiscriminately receive all kinds of juices; others are fed by only some particular kinds, and so far reject others, that they pine and die, if the earth in which they are planted happens to be exhausted of the juices they require.

I have made several experiments in this matter. Some plants have not succeeded in a soil where others have thrived amazingly. It is not that these plants required a great quantity of nourishment; for the land was very good, but it had not the quality the plants required.

Some plants are so voracious that they naturally imbibe all kinds of juices and salts: if their proper food is not at hand, they will take some of a nature inferior, nay sometimes hurtful.

Oxen, horses, sheep, &c. are fond of grass either green
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or dried; for want of this fodder they feed them with straw, and sheep with leaves of trees.

In time of war or scarcity we have been frequently obliged to feed our cattle with half-rotted straw or stubble that had been used for thatching. No one can say this is their natural food, neither can it be at all times recommended. Dogs are not fond of fish, and much less dry than fresh: yet we learn from the relation of travellers, that the inhabitants of Siberia, who use great dogs in their sledges, lay up no other provisions, either for themselves or their dogs, but dried fish.

The diversity in the food occasions also a diversity in the effects. Different salts and dungs occasion great differences in the taste and colour of plants, of their fruits, of their flowers, and of their properties. This is a well known truth.

Skilful gardeners well know what manures they should use to give a good taste to their pulse, and what on the contrary they should avoid, for fear of giving the plants a bad taste.

It may not be amiss to give a few instances of this; they will serve at the same time to prove that the quantity and quality of a food, to which the plants are not accustomed, produce astonishing effects, and hasten their destruction.

A friend of mine, who is yet living, assured me, that having an inclination to plant some maize or Turkey corn, he collected several sorts of dung, such as that of cows, horses, sheep, goats, hogs, pigeons, poultry, &c. of which he made a steep. In this he steeped his seed till it swelled. The maize was all of the whitish yellow sort. At harvest there was a perfect variety in the corn, a light and dark blue, a red, with a whitish and full yellow, being visible on the seeds; and the sheaths of the stalks were of all these colours.

The same thing happened to me a short time since. I caused some of this seed to be planted, all of the yellow kind, in a piece of land where formerly all kinds of dung
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and filth had been thrown; and I had the same variety in the seeds at harvest.

Florists observe, that the variegated tulips are never so fine, nor so much varied, as when the bulbs of the roots are ready to perish; whence they conclude, that this great variety in the colours is a disease. They seem to me to be in the right. Bulbous rooted plants require more nourishment than those which are fibrous rooted; they imbibe and receive every kind of moisture and liquid, together with all the juices and all the salts which these liquids contain.

It happens to them, as it too often happens to men, that intemperance, excess, and a variety of food, bring on diseases and death. Every year the most valuable bulbs are taken up and replanted: the earth can never be so equally prepared as to contain the same juices; the bulbs of the flowers feed on them all; in the end however they languish, and perish prematurely.

Another fact serves to confirm this argument. If the bulbs of tulips are left many years in the same soil without being taken up, the flowers become either wholly red, yellow, or sometimes white, according to their original colour; at last they grow small, their petals pointed, with green edges. The reason for this may be discovered in the preceding observation. As soon as the variety of juices is exhausted, and that only the grosser and more ordinary kinds are left, the variety of colours is of course at an end: finally, these last are so far exhausted, that they cannot produce perfect flowers, either in point of size, shape, or colour; the colour of the leaves, which are satisfied with ordinary food, mixing itself in the flowers.

The violet and the gilly flower may be variegated by nitre, or by any nitrous substance: by lime rubbish, marl, ashes, &c. It may perhaps be alledged that this is a proof that plants are indiscriminately nourished by the same juices: but I say, that this is a disease occasioned by a super-abundance of nutritive juices, or by their being of an opposite nature.

A curious fact related by M. J. Aug. Grotian, Avocat of
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the Imperial town of Nordhausen, in his treatise on the culture of violets, pinks, and auriculas, will serve as a proof of this assertion. "With a lye made of sheep's dung, I have, says he, changed a red violet into a mottled colour: it was a plant with single flowers, and full blown. It grew in a middling sized pot, such as is generally used for pinks. I made the experiment after sun-set, and finding the earth required a good watering, I put the pot into a tub full of lye made of sheep's dung, in such a manner, that the liquor was a little above the edge of the pot. I left it there for twenty-four hours, after which I set it in a place where the superfluous liquor might drain away. In about an hour I found that all the flowers were very elegantly mottled, but in a few days afterwards the plant languished and died." This instance shews the effects of too great an abundance of such nourishment as the plant had not been accustomed to.

If this water, impregnated with sheep's dung, had not been too plentifully applied, or if it had been lowered by other mixtures, or by plain water, the plant might possibly have supported it. But its constitution could not resist this plethora, occasioned by so succulent a food so plentifully applied, and which it was forced to imbibe on account of its dry state. This is like what is said of a lady of quality, who hearing of some people being starved to death, seemed much surprised at it, asking why these people did not eat bread and cheese rather than be starved; which food she herself would be content with, if she could get no other?

It is also remarked, that the same plants do not thrive equally well in all places. Some thrive best in vallies, others on rising grounds, and not a few on mountains. Some again prefer dry situations, whilst others grow best in moist grounds. Some grow in springs of clear water, but others thrive best in putrid water, growing most luxuriant in muddy marsh ditches. Does not this difference manifestly proceed from the different juices contained in these different soils?

Some may attribute it to heat or the air; but the degree

gree of heat has very little or no influence in this matter; for it would be very easy to find places equally hot or cold. The air might indeed have some little influence; but it appears to me, that the whole may be attributed to the quality of the soil.

I must here refer to an excellent essay, written by Mr. de Graffenreid Lord of Worb, on the culture of exotic trees.

The chamærhododendron, and several other Alpine plants, were so difficult to be cultivated in gardens, that some have asserted it was impossible to make them succeed. He has, however, found the secret of doing it, without borrowing either the sun or air of the Alps, only by endeavouring to prepare the earth for them, in such a manner, that it may as much as possible resemble their native soil. Who then can assert, that all plants extract the same nourishment from the earth?

An experiment I have made, though less fortunate, evidently confirms what is above related.

I had a mind to remove some very fine plants from the Alps into my garden. None of them succeeded. I found that the difference of the soil was the occasion of it.

I then procured and planted some *Silene à caulis*, preserving a globe of earth about the root of the plant. This fine plant thrived very well whilst it was nourished by its native earth; but soon after it was transplanted, notwithstanding all the care I took, it died.

The improvement of land by marl, in like manner, supports my system. It is well known, that this manure, in a greater or less degree, abounds with alkaline and nitrous particles.

It is of infinite use in arable land; for being mixed with the soil by the plough-share, it pulverizes the earth by its salts, destroys the weeds on the land, at the same time yielding corn with strong stalks, large ears, and sizable, heavy, well-fed, and perfect grains.

Since therefore marl destroys certain plants, and gives an extraordinary vigour to others, how can it be said, that all plants require the same nourishment? But to go still farther,

ther, it is well known, that if pure marl is applied for any length of years, the soil will be impoverished so as to bear nothing. What reason can be assigned for this sterility? I can readily discover it in my hypothesis.

Marl contains, in any plentiful degree, only one kind of salt; insomuch that the others can scarcely be brought in comparison. Now plants, having occasion for different salts in a greater or less degree, exhaust the soil of these other salts. After this, only that kind of salt remains with which marl abounds, and this is not alone sufficient to afford nourishment to plants which require a mixture of salts.

It is on this principle that, to remedy this inconvenience, they do one of these two things, either mixing the marl with dung, or else, after having used, for three or four years, marl alone, they dress the land with dung alone. In this method they get amazing crops. And what is the reason of it? It is on account of the plenty and variety of salts contained in the marl and dung, by which the plants are supplied with all the nourishment they require. Amidst this plentiful variety of food, they may prefer that which is best adapted to their nature, and in such a proportion as will satisfy their wants.

I shall now explain my idea by an imaginary calculation.

Let us suppose ten sorts of plants, and that these ten sorts should require twenty kinds of salts or juices.

One will want ten-twentieths, another five, another four, another three, another two, and another one-twentieth of one of these kinds. Here then are twenty five-twentieths. Thus we find a deficiency of five-twentieths of this kind of salt, to afford the plants food in proportion to their nature and their wants. What must then be the consequence? Doubtless the plants which require the largest quantity of one particular kind of juice, having their organs better adapted to attract and imbibe that juice than the other plants which require less of it, will engross the whole quantity, to the loss of their neighbours, which will die, if this food is any ways essential to them, or at least languish.

But

But what will be the consequence if of ten plants growing in this soil, four should require ten, twelve, or fifteen, twentieths, and that of course there would be a deficiency of two-thirds of the necessary nourishment? Must not two or three be overpowered by the rest, and absolutely perish?

By adopting these principles, we may give a very simple solution to a phenomenon; which the ancients could no otherwise explain than by the terms *sympathy* and *antipathy* of plants.

One plant requires eight twentieths, another five, a third four, and another three twentieths of one same kind of nutritive juice; the other part of their food being extracted from various substances which three of them have no share in. All thrive and prosper; this is a *sympathy*. But when, according to the above-mentioned supposition, the contrary happens, and that one plant robs another of its food, it is called *antipathy*.

How comes it to pass sometimes that a poisonous plant and its antidote will grow in the same place, and often very near each other? Can we persuade ourselves, that plants of so very contrary natures imbibe the same juices?

We shall give a few more instances; experience should be our only director.

All florists know that no mould is more proper for the bulbs of hyacinths, tulips, &c. than some wherein cabbages, and other pulse grew the preceding year. Whatever quantity of food these so succulent plants may have required, there will still remain sufficient for the bulbs of flowers, which require but little less; it must then necessarily be a juice of a different nature from that required by the pulse.

But farther, florists recommend to us never to plant the same kinds of bulbs for several successive years in the same place, but to change them for other sorts. Does not this practice shew, that they do not suppose the earth impoverished, but only exhausted of that kind of juice which was required by one sort of bulb.

If this is the case with bulbous plants, which have a

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greater analogy one with the other than the numberless perennial and annual plants, we may easily judge, that there must be still a greater difference in these last.

Let it not be said that I contradict myself, because I have observed above, that bulbs, and amongst others, tulips, imbibe all juices. I admit that there are plants which take in all kinds of food, but it is for want of better. If they meet with such as is best adapted to their nature, they quit that which is less so, and take the best.

I shall now mention another experiment. I have observed in an arable field, which had been sown two years with bear or square barley, that at the third sowing with rye, the *hypericum perforatum*, St John's wort, would make its appearance, and increased so much in the year of fallow, as to cover the land. Can it be said, that as fast as it grew the seeds dropped and multiplied the plants? This explanation cannot have place, because the second year after the land was laid down to grass, a very small quantity of this plant remained, and still less and less every year.

This fact can no ways be explained by any other system, except that which I adopt. The St John's wort found very little nourishment whilst the bear was on the land; more when the field was sown with rye; but when there was only a little grass on the land, this plant took possession of the whole. In the end, however, notwithstanding the prodigious increase of its seeds, the grass increased and killed it.

The same thing is observed in the different kinds of grain and land. Sometimes wild mustard appears, at others cockle and blue bottle. These plants unfold their parts, germinate, shoot, and grow when they meet with juices adapted to their nature; but they remain in a state of inaction when they are deprived of these juices.

I shall give another instance, which, in my opinion, should decide the question.

M. Reichard, one of the principal magistrates of Erford, has diligently applied himself to the study and practice of agriculture.

agriculture. He had the advantage of his father's example. He says that for eighty years past (in 1754) both one and the other of them have endeavoured to lay aside fallows, and to plant or sow the same land for several successive years. His father accomplished it for twelve years, and himself for eighteen. How came they to think of doing this? In a work published in German by the son, in five volumes, called, *The Treasure of Ariculture and Gardening*, the following is laid down as an incontrovertable principle.

"It is certain, says our author, that every fruit and plant only extracts from the earth the salts and the substances which are required by its nature and essence, and on the contrary rejects and leaves those which are required for the vegetation of other plants. This requires no very extensive proof, because the truth of this principle is within the reach of our senses, being evident to our sight, our taste, and our smell. It is manifest that an onion has extracted from the earth juices very different from those extracted by a carrot. It is in the same manner apparent, that those kinds of pulse which form themselves in the earth, have not extracted from the field the same particles as the poppy, anise, bastard saffron, and other plants of the same nature require, because they chiefly consist of oily particles."

From this our author draws a conclusion which becomes a second principle. "We may, says he, hence conclude, that when a soil is exhausted of all the juices proper for the support of a certain crop, so as not to be able to support the same crop another year, it may still have strength enough left to support other plants or fruits.

For this reason crops should be varied as much as possible, not only in gardens but in fields, and by cultivating them in successive order, they should be in such a manner interchanged, that the same crop should not be repeated till the earth has had time to recruit its strength, and collect a fresh quantity of those salts which are best adapted to the vegetation of the particular plants in question.

If it should be asked, how a soil which is exhausted of
certain

certain salts, can, after resting as far as relates to one crop, collect a fresh quantity of the same salts which this particular plant requires, without any new manure being applied? I make answer, that in my opinion these salts are anew collected in the earth from the rain, snow, and dew, principally from the dung which remains, and is dissolved by slow degrees, being prepared for the vegetation of these particular plants."

On these principles have Mr. Reichard and his father acted for eighty years. They made it their study to find out what plants were best adapted to succeed one another. This study is of such real importance, that others being willing to imitate them without having any knowledge of this succession of crops, have never been able to succeed, yet knew not to what cause they should attribute their bad success.

If we reflect ever so little, we shall conceive that these thoughtless imitators inconsiderately sowed or planted seeds which required, in a greater or less degree, the same kind of juices and salts.

Mr. Reichard, who, as well as his father, had for many years studied the nature of plants and their nourishment, sowed with discretion successively the several sorts of seeds. In this manner the earth might, in one sense of the word, be said to be in repose, collecting fresh juices for plants which could not do without them, whilst it supported other plants with the juices the first had no occasion for.

I am apt to think no other possible reason can be assigned for this.

Perhaps in relating the method pursued by Mr. Reichard we shall find an opportunity of making some useful remarks.

1. He lays the first year thirty loads of dung on every acre, which is turned in by the plough before winter, or what he greatly prefers, the spade.

Remark. We must in this place observe, that thirty loads being three times as much as is generally laid on an acre, it is not at all surprising, that the soil should long continue
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in heart: but besides, that this cause cannot subsist above three or four years, we must pay some attention to the plant it is to support the first year.

2. The first year he plants all sorts of cabbages and lettices.

Remark. Every body knows that these plants when cultivated in gardens require a great quantity of manure, and should we calculate how much was laid on the beds where they grow, we should find it greatly to exceed the proportion of thirty loads per acre.

3. The second year he sows onion seed; or, if the quantity would be so large that vent cannot easily be found for it, he recommends the planting of cabbages once more, or of radishes and cucumbers. He says, that the soil not being yet exhausted of the salts adapted to the vegetation of the cabbage, that plant may be hazarded a second year.

Remark. Cabbages are frequently planted several successive years on the same spot; but then the land is fresh dunged every year. Here no fresh dung is laid on, yet the onions, and the other plants recommended by the author, are not less exhausting to the land.

4. The third year he sows carrots, parsneps, radishes, and gourds.

Remark. All these plants require a great deal of nourishment, and extract it from some depth, like cabbages, so that the arguments used by the English writers fall to the ground.

5. The fourth year, bastard saffron, poppies, and kidney beans.

Remark. These plants, at least the two last, require a good soil.

6. The fifth year, turneps, rape, carrots, and beets.

Remark. What! after the land has borne plants which require so much nourishment, does he plant them again? We must then conclude, that during the course of the fourth year, the salts adapted to their growth were collected a-new.

7. The

7. The sixth year bastard saffron, poppies, and millet.
 Remark. Millet is said to impoverish land more than any other kind of grain.

8. The seventh year winter-rye, which if it does not require the best of soils, at least is not contented with one so indifferent as some other sorts of grain.

9. The eighth year winter-rye again.

Remark. In this part of the world it is generally thought that the same grain should never be sown two successive years. It must be admitted, that our author requires that the land should be plowed immediately after harvest; that it remain in this state till the end of October, or longer, if the season permits; that it should then be plowed again and sown.

10. The ninth year barley, wheat, and summer or spring rye.

Remark. All these grains, particularly barley, require a good soil.

11. The tenth year the field must be plowed very deep, and may then be sown with carrots and parsneps.

Remark. Could we have the least hope that such roots would thrive in this land, which should seem to be intirely impoverished in the preceding nine years, if by a deep plowing it was not supplied with the salts adapted to the growth of these plants, not with any manure?

12. In the eleventh year poppies, bastard saffron, fenugreek, cumin, coriander, anise, &c.

13. The twelfth year winter-rye.

14. The thirteenth, barley, spring-rye, and summer-wheat.

15. The fourteenth year millet, fenugreek, cumin, peas, kidney beans, broad beans, French beans, lentils, &c.

16. The fifteenth year barley.

17. The sixteenth anise, carrots, vetches, and coriander.

18. The seventeenth year oats, or if you will poppies, and then

19. In

19. In the eighteenth year oats.

Remark. Many of the crops we have above particularized occur in the account of the succeeding years.

This author gives also some other courses of crops. The sample I have already given will answer my present purpose; I must refer those who are willing to know more of the matter to the work itself.

He carries his system four years farther; he would have us reap the fruits of our land twenty-two years, without any fresh manure being applied, and without interruption.

Let us add one more remark on this subject. Arguments however good, and founded on sound reason, they may be, are liable to be contradicted by other arguments, which often bear the appearance of truth. This is not the case with facts and experiments; if we would not appear absolutely incredulous, we must submit to their force.

Mr Reichard caused his work to be printed at Erford, immediately under the eyes of his countrymen. He refers to their testimony, and nobody has as yet contradicted him. It is therefore proved, that all these facts are incontestably true. The consequences therefore to be deduced from them in favour of this system cannot be less so.

I should, however, imagine I had treated this important subject much too slightly, if I passed over the arguments advanced by the English authors, and defended by the celebrated du Hamel, in favour of the contrary system.

Nothing can be more extraordinary than the answer which the English make to the observation, that the flesh, the shell, and the kernel of the peach must necessarily be composed of different juices.

They say that the earth which furnishes these juices, has no resemblance to the parts of this fruit. Was there ever such a solution before made? Can a coarse earth mixed with a thousand heterogeneous parts, have the same taste, or the same properties, as the infinitely dilated particles which have been extracted from it? It would be very easy to retort the argument, by saying, that the
earth

earth has not the taste of the fruits ; that it is neither sweet, bitter, acid, oily, or salt, therefore the fruits extract no nourishment from it.

The flesh of the peach is sweet, the kernel is bitter and oily, the shell is a woody substance. If all these proceed from the same juices, we may as well say that a house of clay, stubble, brickwork, timber, freestone, sandstone, or marble ; in a word, that the windows and spring water are all of the same substance, because they are all parts of the same house, and are all extracted from the earth. Why may not we also say, that painters colours are all the same, and made from the same drug ? Hitherto I have imagined that the parts required to form a woody substance, a solid or oily substance, and a watery or liquid substance, were different ; but in the opinion of these writers, I have been in an error.

They also say, that corn does not put forth deep roots, and that for this reason it thrives very well after clover and lucerne ; but that these last do not succeed after saintfoin, which sends its roots deep into the land.

In this there are several errors. 1. It is true, that we do not distinguish any tap root, or rather deep roots in corn ; but are we certain, that the several sorts of grain do not send their roots deep into the land when the soil is well prepared and adapted to their nature ; many proofs of the contrary might be brought. Besides, why do farmers in some places plow so deep a furrow, even frequently to the depth of a foot or more ? Does not the farmer imagine when he takes this trouble, that the roots can draw nourishment from that depth ; and does not experience convince us, that in strong lands deeply plowed, the corn is less subject to lodge, and is more vigorous ?

Fortunately they do not assert, that corn will thrive well after saintfoin. This would be in contradiction to all experience, though that plant sends forth very deep roots. But they do not assign any reason for this, which is, however, very simple, being the same why lucerne and clover do not succeed after saintfoin. Saintfoin thrives in the most barren,

barren, sandy, gravelly, and dry lands ; but the two first, like all sorts of wheat, require on the contrary a good soil.

The author of this essay addresses his objections to Mr Du Hamel, as being the great partizan of the English system, on the effects of the form or organization of plants. If there is any doubt of Mr Du Hamel's meaning to attribute the various effects of vegetation to this organization alone, without the concurrence of any difference in the juices ; it is at least the sense which his words seem to import. It is therefore only on this first supposition, that we address to him these objections, which are meant to prove how little satisfactory such a system is.

Let us now see what objections M. Du Hamel proposes. " It cannot be doubted, says he, but that the earthy particles which plants imbibe, assume different forms in every plant ; but it does not thence follow that the nutritive juices are not the same whilst in the earth."

It should seem then that Mr Du Hamel looks upon the form and organization of the parts alone, and not the matter, the nature of the food, the juices, as the cause which makes a peach have a downy skin, a delicious watery melting and sweet flesh, a shell harder than wood, a kernel softer, yet firm, sweet or bitter and oily, and this wonderful organization must be contained in the space betwixt the end of the branch and the fruit, because in the end of the branch nothing of this kind appears ; whereas I always apprehended, that the several juices being got thus far were distributed according to the rules established in nature, by the sovereign Creator, to form the various parts intirely and absolutely dissimilar.

Firs, for instance, may have the same organization throughout ; their wood is porous and spongy ; if they only required a great deal of nourishment without any regard to its nature, what tree ought better to succeed in wet or even marthy soils than this ? yet in such soils the wood is absolutely unfit for use. It is well known that if the roots penetrate to any water or even to a soil too moist, the trees begin to rot at bottom, before they have attained

attained a third of their natural growth. Such as grow in soils that are rather dry than moist thrive very well; but it is certain that their wood is more spongy, and does not last so long as that which grew in a dry stony or gravelly soil. The reason is self-evident. The juices and salts to which water serves as a vehicle do not agree with the nature of the wood. It requires others which can form a resin.

This fact also proves that plants which require a great deal of nourishment imbibe all they meet with, for want of that which is better adapted to their nature; but as every kind of food is not equally adapted to their nature, it is evident that if they find what is proper for them, they will, after the manner of animals, reject the others.

This author relates an experiment extracted from the Memoires of the Academy of Sciences: That a young lemon of the size of a pea being grafted by the stalk on the branch of an orange-tree, increased in size, ripened and preserved its quality of a lemon without participating in any thing of the orange-tree. "It is therefore necessary, says he, in this experiment, that the juices of the orange-tree should suddenly change their nature in passing into the lemon."

It is evident I relate this passage impartially; but I will do still more, namely, add some other instances to strengthen this argument.

A short time since, a friend of mine, a man of note, shewed me, at his large and elegant villa, a wilding apple-tree, on which were grafted several scions of a superior kind, amongst the rest there happened to be one of a pear-tree, which succeeded as well as any of them.

I will next mention something still more striking.

M. Tschiffeli, (that worthy patriot, institutor of our oecological society) has attempted to graft several sorts of scions, without choice, on the roots of various trees without distinction. Almost all these scions succeeded; whence some conclude that my system is intirely overset.

Let us now examine whether it is even at all affected.

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The two first experiments of the lemon on the orange-tree, and the pear on the apple-tree, are too much alike to be separated. Let us consult Linnæus and his system with regard to plants. In the edition 1752, he has 1090 genuses, and in every genus from 1 to 30 or 40 species. Without attending to sub-divisions, all the pears are of one species, as well as all the apples, plumbs, peaches, cherries, lemons, citrons, oranges. Farther, apples, pears, and quinces, are three several species of fruit of the same genus; lemons, citrons, and oranges the same, as also plumbs, apricots, and cherries, peaches, and almonds.

According to our system the greatest difference of juices should be amongst the 1090 genuses; they will be much less amongst the species, and there will be but very little amongst the varieties of the same species; I mean that there would be a great deal of difference betwixt those of a walnut-tree and a peach-tree, much less betwixt those of an orange-tree and a lemon-tree, and a very little betwixt the several kinds of these fruits. Consequently, why should we be astonished that a lemon succeeded on an orange-tree, a tree of the same genus, or the scion of a pear-tree on an apple-tree?

Gardeners and husbandmen, nay, all who are not grossly ignorant in this matter, well know, that scions of kernel fruit-trees are grafted on kernel fruit-trees; pears and apples on quinces, and those of stone fruit-trees, as peaches, on plumbs and almond-trees; with this management they will take; but I never saw a scion of an apple-tree succeed on a cherry-tree, nor that of a peach-tree on a quince. By drawing the conclusion in the manner of M. Du Hamel, we may say that he who proves too much, proves nothing at all. All sorts of scions grafted on any tree should succeed; but this is contrary to experience.

It may perhaps be said, that I attend not to my subject, that the experiment of M. Tschiffeli proves it to be a truth, that all sorts of scions equally well succeed on all sorts of trees. But this is a mistake, it is only on the roots, which is totally different.

It should seem that the roots of trees greedily imbibe
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more or less all kinds of juices. From the roots these juices pass into the bark, thence into the wood of the trunk, afterwards into the branches and their bark; lastly into the buds, leaves, flowers, fruit, &c. Now let any one judge, by the difference of these juices and their flavour, in the fruit, and in the roots, how much they have been purified, changed, and as we may say, refined in their passage, and by the circulation, before they arrive at their destination.

Let any one chew some wood, some bark, some of the leaves which grow so near the fruit, and lastly some fruit, and then declare whether there is not an infinite difference. The order of nature conveys to every part the juices best adapted to the end for which God created them.

Let any one reflect on the sweetness of the kernel of a walnut, and on the insupportable bitterness of the rind or bark of the shell, which all animals and even insects nauseate. It surrounds the nut, of course it is very near it, and the whole nut, as well the kernel as the rind, is suspended on the same stalk; thus is the difference much more surprising than that of a lemon and an orange growing on an orange tree. Did the same juices nourish both one and the other? Can this great difference be owing to the organization and structure of the nut; or are these organs placed at the end of the branch? Finally, what part could have effected such a difference? Let us reason a little on this head.

We have observed that matter is real, form accidental; what is accidental, may be, or may not be; but matter will always be substantial, let its form be what it may. Wood is still wood, though it may be square, round, hexagonal, octagonal, or of any other form; and should any say that wood is only wood because it is square, without which quality it would be stone, he might with great reason be laughed at. How then can form, which is accidental, have any influence on matter which is substantial? Let it not be said that the form in salts, acids, and oils, occasions their qualities. I will only partially, not wholly, admit

admit this ; if the particles of the various kinds of salts are the same, and give them the same qualities as salts, yet are their effects amazingly various.

But let us advance a step farther. It must be admitted that matter must necessarily exist before form, since matter can successively assume various forms. I will then suppose that the form, the organization, may somewhat contribute to the difference of juices and flavours in a fruit. From whence proceeds the origin of this organization, this form, what is the cause of it? We must have recourse to the matter ; without the matter or substance no form could subsist ; of course it cannot be denied, but that the substance, the matter, the salts, and the diverse juices constitute the primitive cause, and this cause subsists throughout, though the organization may in some sort be assistant to the effects, because the substance remains to the end of nature's operation.

But to return more immediately to the subject in hand. I have supposed 1090 genuses of plants, which for the most part require a particular food. In every genus, taking one with another, there are twenty species. The species, for instance, will require fifteen twentieths of the same food, as orange-trees and lemon-trees ; some will require eighteen twentieths or nineteen twentieths more or less ; and these fifteen to ten twentieths shall be varied by compositions and mixtures more artfully made than those of chemists. We must not then be surprised, if a branch or a fruit requiring only one twentieth or two twentieths should find wherewithal to support itself, amongst the quantity and different qualities of the juices, dispersed in the wood, the branches, and the leaves of a tree, and of a kind which others do not want ; thus is there nothing to be wondered at in the success of the lemon and the pear tree scion.

The same may be said of the grafts on the roots. If I had had any opportunity of observing what grafts succeeded and on what kinds of roots, I might perhaps have been able to have deduced some arguments from the experiment, and made observations on the subjects more exact than I
now

now can ; this not being in my power I will suppose they succeeded on all kinds of roots ; and even this will not prove against me.

We have already observed that the roots imbibe in a manner all the juices they meet with, and that the separation, the coction, the refining, and straining the juices, are only done successively and by slow degrees. If then a scion is grafted in the root, it is near the reservoir of all the different juices, and may chuse which ever is best adapted to its nature, rejecting the others. These roots serve as organs, mouths, and channels to convey to it the nourishment it may require. This is proved by well known experience ; for in grafting on the trunk, at a certain height, or on the branches, such an association never succeeds. If we endeavour to graft a peach on a walnut, though they are both kernel-fruits, or a pear on a cherry-tree, they never succeed. And what is the reason of it ? Because at this height the tree, by purifying the juices, has left behind the greatest part of those which are not adapted to its nature. I therefore conclude that this experiment is rather in favour of my system than against it.

We form to ourselves gross ideas from the evidence of our senses and our false conceptions of things. As soon as we have adopted an idea, we imagine we have discovered the depths of nature, and explain the causes of effects by what we smell, feel, and see. Chemical experiments are the *ne plus ultra*. We imagine that by analysing some substances by chemistry we discover the elements and true principles of plants. This science has indeed been the means of making surprising discoveries, yet have we by the help of it discovered only the grossest of these elements, which must themselves be composed of an infinity of others, invisible, impalpable, and which escape the notice of our senses.

We must not conclude, because we have not been able to discover these juices by the help of chemistry, or by other experiments, that they do not exist. How many real and incontestable facts are there, of which the true causes
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are not known, but conjectures and guesses are substituted for them?

The answer Mr. du Hamel makes to the second allegation, appears to me to be very weak. "We do not," says he, discover in the earth any flavour of the fruit; of course the juices of the earth are not the cause of it." I see nothing of those fine brocades in the worm that spins the silk. I do not perceive this flavour, this taste in raw meat; therefore the ragout is not made of it. I do not see that admirable painting in the colours, either ground or unground, nor in the brush; therefore it is not to them that the picture is indebted for its lustre.

The answer to the third allegation is not more coercive. It is only necessary to read it, to perceive that I am of his opinion, namely, that plants, when they have no choice, indiscriminately imbibe all juices, even such as are detrimental to them; but then they soon decay.

The answer made by Mr du Hamel to the fourth allegation, has already been discussed. It will suffice to say one word with respect to the reason he alledges, why rushes, thistles, or blue bottles, should not, according to our system, kill wheat, as those plants only imbibe such juices as are not adapted to the wheat.

Who informed this writer that they imbibe none of these juices? It is very probable, that according to my imaginary calculation, they have occasion for fifteen twentieths of the same juices, and the wheat also of course requires fifteen twentieths, so that there will be a deficiency of ten twentieths on the whole; some of these plants therefore must languish and die. Wheat is cultivated, and weeds growing naturally, and being of a voracious nature, the last get the upper hand and destroy the first.

Some have endeavoured to prove by chemistry, that plants only transpire a pure phlegm. Besides what we have already said, relative to the insufficiency of chemical experiments, this confirms the allegation, "that every plant only appropriates to itself the parts necessary for its nourishment, and that the others pass off by transpiration." This
writer

writer doubtless means, that the plant, having by means of its root imbibed all kinds of salts and juices, and only reserving what is adapted to its use, the others must of necessity be found on distillation; and in this he is mistaken.

To return to the analogy there is between plants and animals; if man made a good use of his will, he would not hasten his death, and frequently pass the better half of his life in acute pain, which he has brought on himself by intemperance; he would reject unwholesome food, and content himself with that which would contribute to prolong his life, and make him pass it free from disease. Beasts, guided by instinct, take only such as is suited to their nature, unless they are compelled by necessity to do otherwise; it is the same with respect to plants, to which the order which God has established in nature supplies the place of instinct. They never imbibe juices which are not adapted to their nature, unless they are compelled to do it; so that they have no occasion to dissipate them. If they are obliged to receive an uncommon food, these juices, though hurtful, must be converted into nourishment, the same as in men and beasts, and being by their concoction become more gross and substantial, they cannot be dissipated in the air.

One thing more is to be remarked. A great part of the food which men receive escapes by means of various secretions; but that which is converted into blood, is dissipated by transpiration, in order to its being succeeded by the after taken nourishment.

It is the same with respect to plants. The roots attract and imbibe the grosser juices of almost every kind, and begin to discharge themselves of some to form the wood, rejecting that which is absolutely contrary to their nature; the juice that is somewhat purified enters into the bark, whence, one part, like the blood, passes farther through the bark and the wood, into the branches; being still more and more subtilized and purified, the juices pass, as nature directs, into the leaves, the flowers, and the fruits; which at length contain only that which is most suitable, select,
and

and exquisite, being the quintessence of all those juices which were originally so gross. This may be compared to the chyle, which is converted into blood; this last, with regard to the internal preservation of the parts of the body, serves only to produce a liquid still more delicate, soft, and balsamic, which enters into the flesh, the nerves, and in fact, into every part that requires to be supported by a kind of nourishment constantly renewed. It should seem to me, that this analogy renders the system I defend more probable than any other.

I ought on this occasion, to mention a nourishment still more subtle belonging to plants; but it would perhaps take up too much time.

Mr du Hamel will have it, that plants transpire, and that the particles which exhale by perspiration, float in the air, and that being borne away by the winds they cannot again fall to the earth whence they were extracted.

I admit of all this; what conclusion can be formed from it against my system? This transpiration, mingling itself with other particles in the air, turns to clouds, dew, rain, and snow, falling sometimes on one soil, sometimes on another, giving a general fertility to the earth, as experience may convince us: Thus his observation falls to the ground.

We may still add, that plants do not solely subsist on the juices extracted from the earth, by the channels and veins of the roots, the wood, and the bark, but also by the leaves. Authors have already acknowledged that they were necessary for transpiration, and to evaporate what was superfluous, in the same manner as the pores of the skin in men; but in my opinion, they, besides this, serve for aspiration, extracting a very subtle nourishment from the air. Many observations confirm me in this opinion.

One of my particular friends, fond of every branch of husbandry from his youth, seeing in the garden of a relation an apple-tree loaded with fine fruit, and knowing that the leaves of vines were pulled off in order to make grapes ripen the better, he thought to bring these apples to a per-

fect

fect maturity, by rendering them the same service. The instant the leaves were pulled off, the circulation of the sap entirely ceased; and the following spring he was still more mortified, to see so fine a tree irrecoverably dead.

I have indeed myself observed in vines, that the more leaves are pulled off, the less the grapes ripen; for though they become yellower than the others, they are not so juicy, nor of so fine a flavour. It cannot be said that the transpiration was stopped in the apple-tree, as this might have been continued through the bark and the end of the stalks whence the leaves were taken; and even if it had been stopped, the effect would have been quite contrary to what it was; for the fruit would have been large, but less delicate in its flavour, because the sap would not have been purified by transpiration.

What confirms me still more in the opinion of aspiration, is the dew, and its wonderful effects. It is well known not to penetrate the earth, at least not so far as the roots of plants, to what cause then must we ascribe the admirable service it is of to all plants? It attaches itself only to the leaves and flowers, or at most to the bark: the effects we see result from dew, can never proceed from its cooling quality only; it is of much greater service than rain, and this last than common water; though if in times of great drought, when even dew does not fall, entire trees, particularly the leaves, are refreshed in a morning with common water, by means of an engine, the effect will be surprising.

The honey-dew, on the contrary, does infinite damage to trees, because it stops the pores of the leaves, and prevents both transpiration and aspiration; the tree then resembles a man who is within full of humours, and whose perspiration is stopped.

I am therefore of opinion, that all plants receive the most subtile part of their nourishment from this aspiration; the dew attaches itself to plants, by imperceptible and slow degrees, and it is necessary there should be a matter as subtile as dew, to serve as a vehicle to particles still more subtile.

tile. It undergoes a thousand and a thousand evaporations amongst plants, and every one extracts from it that which is best adapted to its nature; but that these particles may have their natural effects, the juices extracted from the earth, which make perhaps ninety or ninety-nine one hundredths of the whole, must have done their part; for if this is not the case, these imperceptible particles cannot act on the others, which are infinitely grosser and more material.

We may pass over the answer to the sixth allegation. Mr du Hamel, in his answer, attributes the cause why wheat does not succeed two years together on the same land, to the number of plowings being lessened; this is not of consequence enough to detain us a moment, as the principles we have laid down explain it in a very simple way.

I shall now conclude, hoping that though my system may not be allowed as absolutely certain, that yet it will be acknowledged as founded on probability, at least; and if this system has any foundation in truth, it merits a strict examination, and that experiments should be made, as the many parts of it are very difficult to be accounted for. With this view only it is that I have consented to publish my ideas, not being desirous of excelling, or of teaching others, who may have much more knowledge in these matters than I pretend myself to have.

DRESSINGS for LAND.

MUSEUM RUSTICUM, July 1764. No III.

To the Editors of the MUSEUM RUSTICUM.

GENTLEMEN,

IF the under-written will be of any service to the public, pray insert it in your collection.

A short Dissertation on Marle.

IT is taken out of the bowels of the earth at several depths, is of divers colours as after-named, and some sorts have

have often two or three colours intermixed. It is unctuous, of a slippery nature, and in goodness pure; soon relents after rain, and, when dry, slackens like lime, and at last dissolves into the finest powder.

I intend to leave with you some specimens of two kinds of marle (which you may give to the gentlemen or farmers who desire them): they are what I have collected in Middlesex, which county abounds with good marle; but it is not used by the gentry or farmers so much as it ought, because they have so readily dung, foot, ashes, and other composts, from London.

In order to discover marle, the best way is to use the auger, and observe the strata taken up from time to time by it.

I have found, after I have got through the surface, which is about a spade and half deep, that the next earth was a very strong, coarse, bed of clay, five or six feet deep; afterward, getting through it, the auger brought up marle, viz. that which appears of a fine light-brown colour, and some of it mixed with blue veins (which I will here call *pigeon-marle*, by way of distinction): here was a bed of this pigeon-marle of five or six feet deep, and after that followed another kind of marle, which I will call *toad-marle*, by way of distinction; this is heavier, and without any veins of blue.

When either of these marles are dug out of the pit, the spade cuts them like so much soap; and the last named marle looks very blackish and dark, and may be, and I believe is, in some countries, called *toad-marle*, from its resemblance in colour to that animal; but this marle being exposed to the air alters the colour very much. This appears to me to be the strongest marle.

Marle may be discovered sometimes near the surface, by carefully observing the ditches and fences of your lands.

It is frequently found near rivers, or brooks, and sometimes may be discovered on the banks of such waters.

To know when you have found true Marle, try it by Air, Fire, and Water, or Vinegar.

First, By exposing a large lump of three or four pounds in the air, which, if true marle, will, in a little time, by the nitre, dews, &c. break into small parts; and there will be an hoary or white congelation on that part of it which is exposed to the sun.

Secondly, When your marle is dry, break it into small particles, and put an handful into an hot coal-fire, and it will crackle as if so much salt had been put therein.

Thirdly, Place a piece of the dried marle in a glafs, and thereon gently pour as much water as will cover it. If true marle, it will then gradually moulder, and dissolve into a liquid soap. Let not the glafs be shaken, that you may observe the ebullition (which is material); or you may, in like manner, try it with vinegar, where the effervescence, or struggling, will be much stronger than in water.

The virtues of Marle.

It is the best manure for sandy, dry, gravelly, or light lands of any kind. It is excellent for mossy lands. It is indeed good for all other lands, of what nature soever, even clay *, provided care be taken in laying on a proper quantity, and that the same be well dissolved.

Care must be taken in the quantity used; if too little, you may easily add; but if too much is laid on the land, you cannot take it away.

It is used in some countries for arable lands only; yet it is as good for grafs or pasture lands, but does not the first, and seldom till the second year, shew forth its utility; and then

* We should be very much obliged to our correspondent if he would inform us what precautions are to be used in marling clay, which kind of marle is best suited to it, and in what quantities it should be laid on. Our principal reason for giving him this trouble is, because many farmers are of opinion, governed by an old prejudice, that marle is by no means a proper manure for clay. O.

then you will observe the grafs to shoot out a dark, or blackish colour, which afterwards turns to the finest green; and with it come up quantities of white clover grafs, which hath occasioned me some difficulty with the farmers to convince them I had not sown the clover-feed.

If lands are properly marled, they will continue good for twelve or fourteen years for the plough; and for pasture, or-grafs-lands, much longer.

I would recommend that the plough be not suffered to enter into the land till the marle is thoroughly dissolved.

Fish thrive prodigiously, and grow fatter in marle pits than any other ponds.

Quantities to be used.

A great difficulty this to ascertain the quantity.

In some counties they will tell you of laying three hundred loads to an acre, others more, others less; but they no where ascertain what is a load. In Cheshire and Lancashire their loads are scarcely six bushels, and they use a small cart made for the purpose, drawn by two or three small horses.

If the land is gravelly, sandy, or light, let as much be laid on it as will make a good thick coat to bind and stiffen the soil.

But let the land be what it will, so much should, in all events, be laid on as will make a thin coat over the entire surface.

Upon my lands, which are grafs and pasture, of a tolerable mould, on a clayey soil, and which were left, about eight years since, in a bad plight, by the late tenant, I first attempted to lay ten loads to every acre, (by a load I mean as much as three large, well-fed, strong horses could draw); but found it was too little, and would not meet in the spreading.

I immediately doubled the quantity, and two years afterwards I added another coat of fifteen loads more to every acre, and find it answers very well for hay and pasture. I need not say horses and cows are fonder of this
hay

hay and grafs than of that wherein the dung may be tasted and fmelt.

A work of this kind should be fet about by the end of Auguft, or beginning of September; and the loads should be fhut into fmall heaps, as the Middlefex farmers fhoot their dung, *viz.* two or three bufhels in each heap; and a man muft be ready to feparate it, that the nitre, air, dews, and rain, coming on the large pieces, may aét, and caufe them to break, as of themfelves, into fmall parts.

After the marle has lain upon the ground, and you fee that the air, nitre, &c. have loosened the great lumps, and they are ready, on a flicht touch, to fall into pieces, a perfon fhould be ordered (when the weather and marle are quite dry) to break and fpread the pieces to complete your coat; and you fhould avoid, as much as poffible, leaving any large pieces to lie and difsolve without being fpread on the furface, but caufe them to unite therewith.

In the beginning of February, and in dry weather, I caufe an old gate to be well bufhed, and a heavy weight laid on it, to be drawn by one horfe over the whole field, in order that every part may have its due proportion.

If you intend to plough your lands, the preceding cautions are not fo neceffary, as the plough and harrows will fpread and intermix the marle with the foil fufficiently; but if you ufe the drill-plough, the above hints may be ufeul.

It would take a volume to give an exact and full hiftory of marle, its virtues, and ufes, and to fhew that it was ufed by the Romans, and many years difcontinued, and efpecially till the houfes of York and Lancafter were united, and then revived in fome few counties; and the great benefits received by marling in Suffolk and Norfolk within a few years paff.

We very well know that gentlemen and farmers are a long while ere they care to venture on the praétice of marling from theory, and principally from not having feen or known what is, and what is not, true and genuine marle, and from being unacquainted with the rules or modes to judge and determine upon it. Therefore, if this fhort
effay,

essay, with the specimens * I intend to give, will obviate their doubts, and in any way contribute to the advancement of agriculture, vegetation, and pasturage, my design is answered.

There are variety of colours in marle, *viz.* blue, white, yellow, red, and other colours, which make no material difference, provided they be earthy and fat, or slippery as soap, and as free as possible from a mixture of sand, gravel, or stone.

I have often chewed marle, but never yet could distinguish any other than an earthy taste in it, and apprehend it similar to the best water, and the best of oils, which have no taste; but when the marle is dissolved in water, and you spread or rub it on your hand, it has a very strong, earthy smell.

I cannot conclude without a necessary quotation from Lord Bacon, and shall leave the reader to make his own comments and observations thereon, *viz.* His Lordship, in his account of natural improvements by mixtures of earth with earth rather than dungs, recounts *marle* among others, and gives it the pre-eminence as the most pinguid, rich, and least over-heating.

X. Y. Z.

London,
July 25. 1764.

A Member of the Society of Arts,
Manufactures, and Commerce.

DRESSINGS

* These specimens are left with Messrs Davis and Reymers, bookfellers, in Holborn, where gentlemen or farmers may see them, and, if they please, have samples given them for their use.

DRESSINGS for LAND.

MUSEUM RUSTICUM, November 1763. No 51.

A Letter to the Editors, on the Nature and Uses of Peat-ashes, and the several Crops to which they may be profitably employed as a Manure.

GENTLEMEN,

THE more general a manure is in its uses, of so much the more value is it to the farmer; and, of all sorts of manures, perhaps ashes agree with the greatest variety of soils and crops: ashes *, therefore, should, one would imagine, be had in universal request, for the purpose of dressing land; but the misfortune is, no great plenty can be procured, and the few that are to be got fetch a large price: this deters the farmer from making use of them often as manure.

I must, however, except one sort of ashes, which are on all accounts valuable; I mean peat or turf ashes: these are in most places easy to be procured, cost no great matter, and have a wonderful effect on almost every soil and crop. You may believe what I say, as I have had many years experience of their good qualities.

The sulphureous and saline particles with which these ashes abound, have a most happy effect in promoting vegetation; and if used with discretion, the increase procured by them is truly wonderful.

I suppose few of your readers will be at a loss to know what peat or turf is, most people having seen a kind of it burnt as fuel.

H

The

* All kinds of ashes have their several degrees of excellence; yet some are much to be preferred to others; and perhaps peat-ashes, on account of the quantity of salts and sulphur they contain, are at least as good as any. R.

The ordinary peat is dug from wet bogs and morasses ; but that which is of a much superior quality and virtue in its ashes, is dug from moory wetish lands, which will bear cattle : as to the peat that is pared from the surface of heaths and commons, for firing for the poor cottagers, the ashes of it are of very little value, when compared with those above mentioned.

Peat is found in most low grounds that lie betwixt hills, especially if timber has formerly stood on the spot. It lies at various depths, being often near the surface, and sometimes six, eight, or ten feet deep, having a stratum of black moory earth over it, such as is the soil of many of our low meadows near the banks of rivers : it sometimes even lies under a bed of gravel.

Peat may be burnt, for the sake of procuring its ashes for manure, all the summer-season : as soon as it is dug, some of it is mixed in a heap regularly disposed with faggot-wood, or other ready-burning fuel : after a layer or two of it mixed in this manner, peat alone is piled up to complete the heap. A heap will consist of from one hundred to a thousand loads.

After setting fire to it at a proper place, before on purpose prepared, it is watched in the burning, and the great art is to keep in as much of the smoke as possible, provided that as much vent is left as will nourish and feed the fire.

Whenever a crack appears, out of which the smoke escapes, the labourer in that place lays on more peat ; and if the fire slackens too much within, which may easily be known by the heat on the outside, the workman must run a strong pole * into the heap in as many places as is necessary to supply it with a quantity of fresh air. When managed in this manner, the work goes on as it should do. It is to be noticed, that when once the fire is well kindled, the heaviest rain does it no harm whilst it is burning.

Having procured a sufficient quantity of ashes, the farmer's

* This peat seems to be burnt much after the manner in which charcoal is made ; though there cannot be so much delicacy necessary in the operation. R.

mer's next care should be to apply them properly to use; and to do this, he must be made well acquainted with the nature of the manure he is to lay on his land.

All ashes are of a hot, fiery, caustic nature; they must therefore be used with caution. With respect to peat-ashes, almost the only danger proceeds from laying them on in too great quantities at improper seasons.

Nothing can be better than peat-ashes for dressing low damp meadows, laying to the quantity of from fifteen to twenty Winchester bushels on an acre: it is best to sow them by hand, as they will then be more regularly spread. This work should be done in January or February at latest, that the ashes may be washed in towards the roots of the grass by the first rains that fall in the spring.

If they were spread more forward in the year, and a speedy rain should not succeed, being hot in their nature, they would be apt to burn up the grass, instead of doing it any service.

It is to be remembered, that the damper and stiffer the soil, the more peat-ashes should be laid on it; but in grass-lands the quantity should never exceed thirty Winchester bushels, and on light warm lands less than half that quantity is fully sufficient.

On wheat-crops these ashes are of the greatest service; but they must be laid on with the utmost discretion. Were they to be spread in any quantity before the winter, after the sowing the corn, they would make the wheat too rank, and do more harm than good*; was the spreading this manure, on the contrary, deferred till the spring, the corn could not possibly during the winter-season be benefited by it. After due reflection and repeated experience, my method of management in this case is as follows.

About the beginning of November, before the hard frosts set in, I sow on every acre of my heavy clayey wheat-land
about

* This seems, by our correspondent's account, to be upon the whole a critical manure, but may with proper care be of great service. N.

about eight Winchester bushels of these ashes; on my lighter warmer lands in wheat, I sow only four bushels at this season.

The winter-dressing is, I imagine, of great service: trifling as the quantity may seem, it warms the roots of the plant, brings it moderately forward, preserves its verdure, and disposes it to get into a growing state the first fine weather after Christmas.

About the latter end of February, or the beginning of March, on the above-mentioned heavy lands in wheat, I bestow another dressing of ashes, by sowing of them on every acre eight bushels more; on my light lands, in this second dressing, I allow only six bushels.

These ashes laid on in the spring are of the greatest service, without any probability of danger: if rain falls within a few days after the dressing is laid on, it is washed in, and has a happy effect on the succeeding crop, co-operating with the manure that was laid on in November: if, on the contrary, dry weather for a long continuance succeeds, the first winter-dressing has its full effect, and the quantity laid on in the spring is in fact so small, that there is very little probability of its burning or hurting the crop.

This method has succeeded very well with me, and I have no reason to think it can fail with any one else.

This excellent manure is, I find, of great use in the turnep-husbandry on many accounts, particularly as it much contributes to preserve the young crop from being devoured by the fly *.

When I sow my turneps, before I harrow in the seed, I have eight bushels of these ashes strewed by hand on every acre, and when the plants shew their first leaves above ground, I sow on every acre four bushels more: by this management my crops seldom fail, when at the same time some of my neighbours sow their turnep-land three or four times over.

But one of the principal advantages derived from these
ashes

* The hot caustic taste of the ashes may very probably render the young leaves of the turneps disagreeable to the fly. N.

ashes I have not yet mentioned, which is the very great service they are of to every kind of artificial pasture.

Saintfoin receives great benefit from this manure, and so does clover, rye-grass, and trefoil, provided it is laid on with discretion: the proper season is about the month of February: the quantity must be regulated by the nature of the crop and soil; but, in my opinion, it ought scarcely in any instance to exceed thirty Winchester bushels. Clover, with the help of this manure, grows with great luxuriance, insomuch that I have often had two large crops of hay from the same field in a year, and good autumn feed afterwards.

But the effect of it is most seen in tares or vetches, and on them it is I bestow most of this manure, as they will bear it, being a very succulent plant. I had last summer a crop of tare-hay that was astonishing, by the help of these ashes, being above three large loads on an acre *. The field contained six acres; it was a dryish loam, and not very rich. In the beginning of February I caused ten bushels, Winchester measure, to be strewed on each acre: immediately after the first rains had washed them in, the same quantity was in like manner spread, and about the middle of March I bestowed on each acre six bushels more for the last dressing. I am fond of dividing my intire quantities, thinking my crops are thereby less exposed to the danger of being burned, and the manure is besides more gradual and lasting in its effects.

My tares came on amazingly, but they run chiefly to haulm, which was what I wished, not having any desire of saving the seed, but intending to make the crop in hay: my only fear was, that it would rot on the ground before it was in a proper condition to cut; but this I luckily escaped, by the soil being tolerably dry, and by the fineness

* We should imagine these ashes would be of great service as a dressing for buck-wheat, when it is intended to be plowed in as a manure, because the ranker and more luxuriant it then is, the better. N.

ness of the weather. It was so heavy in the swarth, that I was obliged to pay an extraordinary price for mowing it.

I have observed above, that I was fearful my tares would have rotted on the ground before they were fit to cut : this was owing intirely to the invigorating quality of the ashes, which by their salts, &c. promoted the growth of the plants even to luxuriance.

Before I well knew the great fertilizing quality of these ashes, I lost, by improper management, a fine three-acre piece of hog-peas. I laid on this field, soon after the peas came up, three(ore Winchester bushels of these ashes at one dressing : this brought them forward a great pace, but at harvest I found, to my grief, I had scarcely any corn, for I had overdone it in laying on so much, and the peas were run all to haulm *.

Ever since this accident I have declined using them as a common dressing for my peas ; and this I have been the more induced to do, as, in several little experiments I have since made, I have found it extremely difficult to apportion the several quantities which ought to be laid on various soils when sown with peas ; for the quantity that has one year succeeded very well with me, has the next, owing to the difference of seasons, on the same soil, in another part of the same field, totally disappointed me : so that, for peas, I esteem it a very critical manure, therefore very cautiously to be used.

The effects of this manure will be visible at least three years, and it does not, like some others, leave the land in an impoverished state, when its virtues are exhausted and spent.

Peat-ashes are not so certain a manure for barley and oats as for the winter-corn ; for as these are quick growers, and occupy the land but a few months, this warm manure is often apt to push them forward too fast, and make them run too much to coarse straw, yielding only a lean immature

* Peas rather require a sweet soil unimpoverished, having a natural fertility, than one greatly mended and enriched by manure. A.

ture grain. Oats, however, are not so apt to be damaged by it as barley.

To get a good crop of barley, I often sow it after turneps, which have had two light dressings of ashes, in the manner above described.

When the turneps are fed off, or drawn, I give the field, if the season permits, a good plowing : if they were fed off, the land will want no more ashes ; but if they were drawn, and either carried into another ground to feed sheep, or given to my stall-fed oxen, I strew on each acre, after this plowing, five Winchester bushels of ashes, leaving them to be washed in by the first rain. In this manner I let the land lie till I give it the second and last plowing before it is sown. The manure has by this management the desired effect, and the barley generally produces full and heavy ears.

When I sow my barley after turneps, I give the land only two plowings, because the soil was before much loosened by the hoeings bestowed on the turneps ; but in other cases I am fond of allowing three, and sometimes four plowings to my lands destined for barley ; and I generally find it answer very well ; for many years experience has convinced me, that upon a fine tilth barley always thrives best, and yields most : in fact, the crop is almost always governed by the condition of the land, and a well-tilled soil is less exposed to danger in an untoward season.

Peat-ashes approach, in their effects on the several crops on which they are laid, to coal-foot ; but two thirds of the quantity that is used of foot, will be sufficient of the ashes, as they are, in a much stronger degree, impregnated with a vegetative power ; and they are, besides, in most places, easier procured in quantities, and at a cheaper rate.

It may possibly be objected, that this manure requires great nicety in the application : I allow it does ; yet every intelligent farmer *, who knows the nature and qualities of the soils of his several fields, will soon be able, with great precision,

* It should seem, the farmer ought to use this manure at first with great caution, till repeated experiments have made him well acquainted with the nature and condition of his land. O.

precision, to judge how much he ought to lay on each acre : his chief care at first should be not to overdo it ; for therein consists the principal danger ; though, after all, these ashes will, at the worst, unless laid on in very great excess indeed, only occasion the inexperienced farmer the perhaps partial loss of a single crop ; for the succeeding year they will, in all probability, have a very salutary effect on the land, and sometimes even repay the preceding loss.

When the error is in the excess, it is very easy for a farmer to avoid falling into it ; for, independent of every other consideration, the sole view of lessening his expences will, it is imagined, sufficiently induce him to be attentive to this particular.

When peat is burnt for the sake of its ashes in summer-time, it is necessary that some care should be taken to defend them from the too powerful influence of the sun, air, dews, rain, &c. or great part of their virtue would be exhaled and exhausted. If the quantity of ashes procured is not very great, they may be easily put under cover in a barn, cart-lodge or hovel ; but large quantities must necessarily, to avoid expence, be kept abroad ; and when this is the case, they should be ordered as follows.

A dry spot of ground must be chosen ; and on this the ashes are to be laid in a large heap, as near as possible in the form of a cone standing on its base, the top as sharp pointed as possible : when this is done, let the whole be covered thinly over with a coat of soil, to defend the heap from the weather : the circumjacent earth, provided it is not too light and crumbly, will always serve for this purpose.

When thus guarded, the heap may very safely be left till January or February, when it is in general the season for spreading it : but, before it is used, it is always best to sift the ashes, that the cinders, stones, and half burnt turf, may be separated from them.

This may, perchance, by many be esteemed an unnecessary trouble ; but experience, which is the best guide, has convinced me, that by this means I can better ascertain the quantity that ought to be sown on the several sorts of land ;

for

for the small powdered ashes, being equal in quality, are of course equal in effect; whereas, when there has been any other mixture with them, the effect has often been greater or less than I could have wished. Thus, when I mentioned the number of bushels I strew on an acre, it is always to be understood of sifted ashes: should any farmer be inclined to try them rough as they are first produced after burning, the quantity to be allowed for an acre must be more in proportion to the mixture of other matter that is in them *.

These peat-ashes are almost, as I have already observed, a general manure suited to every soil. On cold clay they warm the too compact particles, dispose it to ferment, crumble, and of course fertilize, and, in fine, not only assist it in disclosing and dispensing its great vegetative powers, but also bring to its aid a considerable proportion of ready-prepared aliment for plants.

On light lands these ashes have a different effect: here the pores are too large to be affected, or farther separated by the salts or sulphur contained in them; but, being closely attached to the surfaces of the large particles, of which this earth is generally composed, this manure disposes them, by means of its salts, to attract the moisture contained in the air: by this operation, the plants which grow on these porous soils are prevented from being scorched up and burnt; and if they want, which they generally do, more nourishment than the land is of itself capable of affording, this is readily and abundantly supplied by this useful manure.

In large farms it is very usual to see all the home-fields rich and well mended by the yard-dung, &c.; whereas the more distant lands are generally poor, impoverished, and

I

out

* The method of using them sifted is certainly much to be preferred, as they must be more certain and equal in their operation. If the farmer is inclined to use the coarse parts that are separated in the sifting, let him lay them separately on some of his stiff land that is in fallow, where they may be of some service. N,

out of heart, for want of proper manure being applied in time.

Whilst the farmers depend almost entirely on their yard-dung, this cannot fail being the case; for dung is of very heavy carriage: they are willing, therefore, to drop it as near home as possible, being in this way able to do a great deal more work in the same space of time: but would they once try the virtue of peat-ashes, all their lands might be alike improved, though at a very considerable distance from the home stall; for so few of them are required, and they are so light of carriage, that a single tumbril will hold as many as ought, in most cases, to be laid on two acres of land; by which means, when these ashes are used as a dressing for the distant fields, it costs the farmer less in carriage than does that of the stable-dung for his home-fields.

You may, perhaps, imagine I have said too much in commendation of peat-ashes as a manure; but be assured it is all warranted by experience: if, however, you still think it too much, ascribe it to the prolixity of old age: I am sure you will pardon me, when I inform you, that it is chiefly to the fertilizing quality of these ashes I owe the ease I now enjoy. A journey to this metropolis gave me an opportunity of seeing your first publication, and of writing you this letter.

I am,

GENTLEMEN,

London, Oct. 21. 1763.

Your humble servant,
An Old WEST-COUNTRY FARMER.

DRESSINGS for LAND.

MUSEUM RUSTICUM, Sept. 1763. No 7.

For the Editors of the MUSEUM RUSTICUM.

GENTLEMEN,

I Herewith send you the copy of a letter I wrote some years ago to a worthy friend of mine, since dead: he followed the directions contained in it, and thereby greatly improved his land. You may perhaps think it deserving of

a place in your collection; if you do, you have my consent to insert it; but I would only have the initial letters of my name printed: my friends know I love husbandry; but I should not chuse to lay myself open to the visits of curious impertinents.

To judge by your proposals, I should be naturally apt to conclude that your collection will be useful: it will at least tempt many to give their thoughts to the world, who would otherwise scarcely commence writers: perchance I may now and then trouble you; but at present I have only leisure to assure you that I am,

GENTLEMEN,

Pall-Mall, Aug. 25. 1763.

Your humble servant,

E. N.

*A Letter from E—— N——, Esq; to Dr **** in Kent, on the Use of Sea-Waure *.*

S I R,

YOU ask my advice relative to a piece of ground, or small farm, you now occupy yourself on the sea-coast: you observe in your letter, that the soil is gravelly, with a small admixture of redish loam; that the under stratum is clay; that it has by the last tenant been plowed out of heart, and now yields only a poor starved grass.

You would wish, I suppose, to get this land into good order as soon as you can; but in these cases no good is got by being in a hurry. I take the natural surface to have been originally a shallow hungry gravel, with very little mixture: when it came to be plowed, some of the clay was
accidentally

* Sea-waure or sea-wracks, or sea-weeds, are reckoned a very good manure where they are to be had at a reasonable rate. They must in their nature be very strongly impregnated with salts, which they impart by degrees to the land they are laid on, and thereby greatly fertilize it. If land is properly dressed with sea-wracks, the virtue of the manure will not be exhausted at the end of seven or eight years: this is a singular advantage, as the benefit of common dung scarcely extends to the end of two years. A.

accidentally brought up by the share, and blended with the gravel: this, after having been, in a few years, rendered mellow and tractable by the influence of the air and sun, is what now bears the appearance of loam, the sandy part of the gravel having made it less compact, and given it a looser texture; and, in fact, whatever virtue there is in the soil proceeds from this mixture.

As we now seem to have found out in what manner this land came to be worth any thing, it naturally points out to us a method of improving it, so as to make it of real value.

Nature is our best guide, and experience will at any time teach us what we may safely do.

Experience has already convinced me, in several instances, that the under stratum of earth may be always safely, and sometimes advantageously, turned to the surface*.

Having premised thus much, my advice is, that you should immediately set about procuring as much sea-waure, or weed, as you conveniently can; not that which is left by the in-flowing of the sea, but what is gathered at low-water from the rocks, &c.; for this last is of much superior virtue and duration.

Whilst this work is doing, take care to lay in a sufficient quantity of lime and raw chalk, and let your men get ready a large heap of earth: loam would suit best, and if inclining to clay, it will not be the worse, as the soil to be mended

* There is not the least doubt but that the under stratum of earth may almost always with advantage be turned up to the surface, especially where the upper bed is of a nature different from it; as for instance, if a thin bed of sand covers a close, compact, and seemingly barren clay, if the farmer is timid, and takes care not to cut with his plow into the clay, his land will scarcely bear any thing; but let him plow deep, and let the clay lie some time to mellow by the influence of the frosts, air, rain, &c. he will in a few years find his soil greatly improved; and the more it is mixed by frequent plowings, the nearer will it approach to the nature of a good loam. Q.

mended is light and gravelly. Your next care must be to form your compost-heap, which is to be done in the following manner.

First, let your workmen spread a thick layer of the earth they have got together, over that a bed of sea-waure, then chalk *, and lastly the lime unslaked, being careful however to cover the whole with a thick layer of earth : it is necessary to remark, that the whole depth of all the layers or beds taken together, or of the whole heap, should not exceed six feet, the length and breadth as much as may in discretion be found necessary. This work you should set about as soon as you can, and it must be suffered to lie mellowing as long as possible.

The sea-waure and lime should be nearly in equal quantities, twice as much chalk, and as much earth as will equal all the other materials taken together in quantity.

By disposing them in the manner I have directed, the lower bed of earth will be greatly impregnated with the saline qualities of the sea-waure, and the chaulk being porous will imbibe, by the power of attraction, much of its moisture. The lime will gradually flake by the dampness it will receive from and through the earth that lies over it, and will by its consequential warmth raise, as it were, the appearance of a fermentation in the chalk it covers, and cause it to be more readily acted upon by the influences of the air,

* We should imagine it would ferment better if the lime were to be laid over the first bed of earth, next to that the chalk, then the sea-wrack or waure, and lastly earth again ; as the autumnal rains, soaking through the upper earth, would then carry with it some of the salts of the sea-waure, and impregnate therewith the chalk : this, together with the flaking of the lime under it, would raise in it the beginning of a fermentation, so as to dispose it to break the sooner when laid on the land. A lump of pure chalk, laid but a little depth under the surface of the earth, will lie for years without dissolving. If the autumn should prove dry, we imagine it would not be amiss to pour a moderate quantity of water over this compost, as it would forward the fermentation. T.

air, sun, &c. when it comes to be laid, with the rest, on the land.

We must now think of what is to be done with the land before this compost is laid on.

To proceed then, get some foot, (if you can, wood-foot; if not, that from London will do), wood-ashes, and flaked lime, one part of each of the first articles, and two of the last. Let these, in January next, be well mixed together in a heap, and let your workmen sow it by hand on the land, as it now lies in grass, to the quantity of thirty bushels on an acre.

If there come mild following rains, or dripping weather, as it is called, in the spring, you will have more seed than you would imagine could proceed from so slight a dressing to such poor land: this is not however all the advantage that is to be expected from it; for on turning up the grass it will dispose the land to ferment and meliorate before the other compost is laid on.

I would have you all next summer feed this land, and when the hurry of your harvest is over, give the whole of it a very deep plowing, so as to turn up a good deal of the clay-bottom; let it then lie still till it has been in some measure mellowed by the winter-frosts.

When you perceive the hard clods that were turned up begin to crumble on a thaw, take advantage of the next frost to lay about five loads * of the compost on each acre, which in the beginning of the winter must be prepared by being turned and well mixed. As soon as conveniently can be, after this manure is laid on, let the land be plowed, observing to break all the lumps of chalk that are bigger than a man's head, till they are reduced to that size.

Keep the land plowing the whole following summer, as well

* This is but a small proportion; yet, as the dressing is more than once repeated, it may probably have the desired effect. It must be allowed, that when the manure is not all laid on at once, it may be more easily mixed with the land, and will more gradually raise a fermentation. R,

well to keep down the roguery, as to break and reduce the soil, and mellow the fresh earth ; but particular care must be taken that none of the succeeding plowings be deeper than the first.

In the following winter lay five loads more of the same kind of compost on each acre, and in the spring, after giving it a preparatory plowing, sow it with oats *. Of these you will have of course a very plentiful crop †.

Let the land be then winter fallowed, and in the first hard frosts lay on each acre five more loads of the compost ; keep it plowing all the summer, and at the proper season sow it with wheat, observing that the seed be not spread too thick ; for it will branch much, and the crop will, if the season is any thing favourable, be very great.

When your wheat is off, turn in the stubble as soon as possible, and get the land into as good order as you can against spring, to sow barley.

As soon as the barley is got in, the land must have a dressing of sea-waure alone, it being laid on the stubble in the proportion of about one fourth part as much as you would use of dung. Let this be immediately turned in ; and in the spring sow oats, rye-grass, and clover, to remain for two or three years, or longer if you chuse it.

When

* With respect to the succession of crops this gentleman recommends, it need not be servilely adhered to ; but other crops, perhaps more adapted to the farmer's convenience, may be substituted, observing however, that wheat be not sown first, but that a previous crop be taken off the land in order to abate its rankness. We thought it necessary to mention this, as there are many farmers who may have land of the nature of that above described, who may be glad to make the experiment this gentleman recommends. E.

† If the land has not been well plowed, so as to mix the manure and under stratum of earth thoroughly well with the upper bed, the farmer must not expect his first crop to be considerable. A great part of the success of this experiment must of course depend on the land being frequently and properly tilled ; in this case it can scarcely be over-done. E.

When you break up the lay, you may take three succeeding crops, by only giving it a slight dressing of either dung or sea-waure, and afterwards either let it lie fallow, or sow with the last grain clover; or, in fact, you may manage it in the same manner you would any other land in good heart, by varying the crops, &c.; remembering, however, that a slight dressing in time does much more good than first wearing out the land, and then bestowing a great deal of money in manure.

You may perhaps be apt to imagine that the first dressing I directed to be laid on the land, might as well be spared; but experience will convince you, that much of your success will depend on it, trifling as it may seem; for the salts with which the lime, ashes, and foot, are so strongly impregnated, will, when the land is plowed, occasion a slight fermentation, and thereby dispose it the better to receive the compost when it is laid on, and to benefit by it.

The chalk * may, it is possible, by some of your neighbours, be deemed superfluous; but assure yourself, that tho' it is slow in its operation, it is no less certain; and when the effects of the lime and sea-waure begin to disappear, the chalk will be found a great fertilizer, and the benefits resulting

* In the hundreds of Essex they chalk annually great quantities of land; by which means farms, which had been before let at less than five shillings an acre, are often so much improved as to be worth from twelve shillings to fifteen shillings, and even more, *per acre*. The chalk they use for this purpose is generally brought from Kent in hoys to Malden, from whence the farmers fetch it for at least fifteen miles round the country. It is to be observed however, that the soil in these parts is for the most part a stiff, and almost untractable clay; yet, when thus manured with chalk, it breeds as fine wheat as any part of England: the quantity they lay on is from ten to twenty waggon loads an acre. The benefit arising from chalk is not for the first year or two much perceived; but from the third year the land bears amazing crops for twenty years together with proper care, and a moderate portion of manure well timed. H.

ing from it will with proper care continue a great number of years: it is indeed difficult to determine how long.

Some farmers, I know, have complained that chalked land in about eighteen or twenty years grows worse than ever it was; but when that is the case, it is intirely owing to the obstinacy, ignorance, or avarice of the farmer, who tires his land out with repeated crops, without ever giving it the necessary intermediate dressings. A moderate quantity of a compost made of yard-dung and lime, laid on chalked land once in three years, would greatly contribute to prevent its being impoverished.

You may be already almost tired of this long letter; but I thought it best to lay the whole matter before you at one view.

You have, if you make a proper use of it, a treasure in being within reach of the sea-waure: the farmers in your neighbourhood will probably persuade you to lay it on, as they commonly do, unmixed; but assure yourself that in most cases it succeeds much better when mixed with lime and earth, and if lime is not proper for the soil, earth alone.

As to the stiff clay which you mention to be the soil of your *upper soft-field*, I do not know any thing that I can recommend better than plowing it well and often, and laying on a large quantity of sea-sand * to break its stubbornness: you can scarcely over-do it. It is a good rule, never to let a stiff soil lie long still without plowing. Let

K

folks

* When a farmer, who has a stiff clay in his possession, is not within reach either of sea-sand or chalk, he may to advantage lay on pit-sand, gravel, lime-stone or brick-rubbish, if he can procure it in sufficient quantities: any thing that will contribute to break the soil, and loosen the particles of earth, will dispose it to give forth its salts, which were before locked up; and this is, in fact, rendering it more fertile. What renders pure clay improper for vegetation is, its having too small pores; sand, on the contrary, has them too large; it must then necessarily follow, that by a judicious admixture of these two extremes a lastingly-fertile earth may be obtained. E,

folks say what they will to you, the only danger of plowing too much proceeds from the expences that attend it *.

Be free, and make any other inquiries of me you think proper.

I am very much yours,

August. 15. 1756.

E— N—.

DRESSINGS for LAND.

MUSEUM RUSTICUM, November 1764. No 61.

On the Benefit of Malt-Dust, as a Manure for a stiff Soil; with a Relation of some Experiments made to ascertain its Virtues.

GENTLEMEN,

FOR the benefit of your farming-readers I shall communicate a few experiments I made some time since, in order to try the virtue of malt-dust as a manure for a crop of wheat.

I had often heard it asserted, that malt-dust was much better suited, as a manure, to barley than wheat; for the latter lying a whole year in the ground, and the malt-dust being sown with it, the virtues of the manure were exhausted long before the summer, when the corn principally wants nourishment, being advanced in its growth, and served chiefly to make the wheat winter-proud.

Others, contradicting this assertion, said it was best for wheat, and made it appear that it often caused very good crops of corn, particularly after a hard winter.

Being

* One other danger there is in plowing much, particularly stiff soils, which is plowing them at improper seasons, for example, in wet weather; which would knead them, so as to make it very difficult to bring them afterwards into a proper tilth. E.

Being determined in my own mind to try some experiments in order to determine this matter, I pitched upon a field of ten acres, which had borne a good crop of horse-beans; after which it was sown with turneps, which being fed off, it was summer-fallowed, being intended for wheat.

The soil was a stiffish loam; it was in good heart, and tolerably clean.

I divided this field by deep furrows into ten equal parts, each containing one acre, numbered 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10.

The whole field, during the course of the fallowing, had four ploughings, which reduced it to a fine tilth.

When wheat-feed-time came, I sowed number 1. broadcast, with three bushels of wheat, and ploughed it in, laying on no manure whatever.

Number 2. I sowed with the same quantity of wheat, after which I strewed over it ten quarters, or eighty bushels, of malt-dust, and ploughed that and the seed in together.

Number 3. I sowed also with wheat in the same manner, except that I deferred strewing on the malt-dust till the latter end of January.

Number 4. had a dressing of dung in the ordinary way, and was sowed with three bushels of wheat like the other parts.

Number 5. was dressed by sheep-folding, and was also in like manner sown with wheat.

Number 6. was sown with wheat in the same quantity, and in February, after sowing, received a half dressing of very rotten dung, which had been several times turned and mixed.

Number 7. after receiving a ploughing in the spring, was sown with ten pecks of barley, which was harrowed in, and no manure at all applied.

Number 8. was sown with barley, as above; but had ten quarters of malt-dust laid on it.

Number 9. had in the winter a good dressing of dung,
and

and was in the spring sown with the same quantity of barley.

Number 10. was sown with barley, like number 8. only it had five instead of ten quarters of malt-dust laid on it.

It may be necessary, perhaps, to observe, that all the pieces of wheat were sown the first week in October, and all the barley the second week in March.

Soon after Christmas I went to take a view of my wheat, when I found that the acre marked number 2. looked most forward and flourishing; though I must own there was in appearance but little difference between that and number 4.

The numbers 1. 3. and 6. neither of them looked so vigorous as those already noticed; and number 5. seemed rather thin on the land; but the wheat-plants were in good condition and healthy.

In May I took another view of my wheat-crops, and found number 1. tolerably clean, and promised well.

Number 2. gave me hopes of a large crop, and was surprisingly clear of weeds.

Number 3. was greatly improved since the laying on of the dressing of malt-dust.

Number 4. looked very vigorous and strong; but was very foul, having several sorts of weeds not to be met with in other parts of the land.

Number 5. was thin of plants, and they did not branch much; however, they still seemed healthy and strong.

Number 6. was like number 3. greatly improved; but it was foul, and, what appeared strange to me, had many weeds of a nature quite different from those with which number 4. was infested, though the dung laid on both these parts was taken from the same heap.

I at this time also looked at my pieces sown with barley, when I found number 7. promising and clean.

Number 8. was forwarder, and flattered me with the prospect of a large crop.

Number 9. was forward and fine, but foul with weeds.

Number 10. bore much the same appearance as number 8. and promised as well.

At harvest number 2. of the wheat was first fit to reap; after which succeeded number 4.; the rest were ready nearly at the same time.

Of my barleys, numbers 3. and 10. were first ready to mow.

I suppose it is unnecessary to observe that those crops which were clearest of weeds were the soonest fit for carrying.

I ordered these crops to be all laid separately; and as I was obliged, just after Michaelmas, to go up to London about some particular business, I left orders with my bailiff, that they should all be separately threshed and dressed as early as might be in the winter.

The produce of the several crops was thus distinctly noted to me; for I had ordered that particular care should be taken not to mix one with the other, and my orders were, I found on inquiry, punctually carried into execution.

	Bushels. Pecks.	
Number 1. unmanured, yielded of wheat—	20	1
Number 2. manured with malt-dust when sown	28	3
Number 3. manured with malt-dust after Christ-		
mas, by way of top-dressing — —	41	0
Number 4. manured with dung in the ordinary		
way — — —	32	2
Number 5. folded with sheep — —	29	3
Number 6. dressed with rotten dung in Fe-		
bruary — — —	30	0
Number 7. unmanured, yielded of barley —	32	3
Number 8. manured with ten quarters of		
malt-dust when sown — —	48	0
Number 9. manured with dung in the winter	40	2
Number 10. manured, when sown, with five		
quarters of malt-dust — —	44	0

I must, with your leave, trespass upon your reader's patience till I make a few observations on the above state of the produce of my crop.

First,

First, I conclude, that when malt-dust is used as a manure for wheat, it is best to lay it on by way of top dressing after the corn is come up, as the crop of number 3. yielded above twelve bushels more than that of number 2.: and I am apt to think that the virtue of the malt-dust laid on number 2. was exhausted before it could be of any essential service to the crop; whereas, in number 3. the manure began to yield forth its virtues just as the wheat-plants began to be in want of a fresh supply of nourishment. It was also observable, that the grains of wheat which grew on number 2. were thinner, and had less substance than those of number 3. the grain of which was fine, plump, and heavy.

The produce of number 4. convinces me that malt dust is, in many cases, a better manure for wheat than dung, not only as it gives a larger increase, but also because it does not stock the land with destructive and devouring weeds.

The wheat grown on number 5. was as fine as that of number 3. but considerably less in quantity, as appears by the account.

I do not much approve of the method pursued in number 6.; yet is it a good alternative, if the farmer happens to have too little dung to dress all his fallows.

I judge also malt-dust to be a very good and profitable manure for a barley-crop; but the yield of number 10. being forty-four bushels, and of number 8. only forty-eight bushels, which last is not an increase in proportion to the additional quantity of manure laid on, I thence judge that eight quarters, or sixty-four bushels, of malt dust is the proper quantity of malt dust to lay on an acre for a barley-crop, and that at the time of sowing.

When I speak of malt-dust, I mean the kiln-dust, which falls from the malt in drying: as to the tail dust, which falls through the screen whilst the malt is cleaning before it is put up in sacks, that may be applied to a better use, being generally given to pigs, and often to cows, in which
last

last case it makes them give a great deal of milk : if I mistake not, I remember to have seen it recommended for this use by a sensible correspondent of yours in one of the volumes of the *Museum Rusticum*.

It has been suggested, that the virtue of malt-dust, as a manure, lasts only for one crop ; but this is a mistake, for when this manure is laid on in January or February, a good crop of barley may be had after the wheat.

It (I mean malt-dust) is of a very warm nature : this has induced many farmers to think that it will burn a crop ; and I will not answer for it but it might do so on a hot gravelly soil ; but on clay-land, or a stiff loam, it seldom or never does any damage : and indeed the only danger is a dry time ensuing after it is spread on the land, for the first shower of rain washes it in, and secures the crop from all hazard of being burnt.

Many of my acquaintance, besides myself, have found that malt-dust is, for a stiff soil, a better manure than dung ; but the dispute among them was, whether it was most profitable to lay it on when the wheat was sown, or by way of top-dressing in January or February : however, since I made the above experiments, they are all converts to my opinion, and are determined in future always to dress their heavy wheat-land with it after Christmas.

One thing more in recommendation of this my favourite manure let me add before I conclude, that nothing surpasses it when laid on cold grass-grounds, to the amount of about eight quarters, or sixty bushels, on an acre ; but not less.

Such as have not seen its effects in this way applied, would be surprised at the large increase of sweet seed which it occasions : in short, whoever finds it necessary to dress such land, and can get malt-dust in a sufficient quantity, will do well to use it, as they will be puzzled to find any thing in the extensive circle of manures better adapted to the purpose.

I should be glad if some of your correspondents would give the public their opinions relative to the various disorders

ders to which cattle are subject: this is a large field, and has, I think, had but little said of it in your collection.

In relating experiments in husbandry, a great deal will still be left to be regulated by the farmer's prudence, experience, and discretion, as circumstances of soil, seasons, &c. must vary; but in this matter of the diseases of cattle, if the symptoms of each disorder are but carefully pointed out, and the proper remedies laid down in plain language for the different stages of the disorder, there will be very little danger of the honest farmer's making any mistakes to his prejudice.

The fellows who go about the country, pretending to cure the diseases of cattle, are, in general, great cheats, getting much money, but doing little good. I never could persuade any of these gentlemen to let me examine the drenches they gave my cattle, being probably fearful I should thereby be enabled to discover and detect their gross ignorance.

It would also please me much to see in your work a letter on the subject of feeding cattle with carrots and parsneps, either of which I am told are very profitable when applied to this use. I should be apt, however, to imagine, that the first were most nourishing; though in this I may be mistaken; for I remember once, by way of experiment, to have fed some dogs with boiled carrots, mixed with barley-meal and pot-liquor; but they voided the carrots in an undigested state: yet their digestive powers may differ from those of black cattle.

I am, GENTLEMEN,

Your humble servant,

Northward,
October 15. 1764.

A GENTLEMAN FARMER.

DRESSINGS

DRESSINGS for LAND.

MUSEUM RUSTICUM, Dec. 1763. No 57.

A Letter to the Editors, on the Benefit of watering Land in dry Summers.

GENTLEMEN,

IF you think the following method of agriculture deserves your notice in the *Museum Rusticum*, a work so well calculated for the improvement of farmers in general, I shall relate the management of a field of five acres, which I laid down in grafs in the year 1762, which proved a remarkable dry one; many crops of new-sown grafs failing through the excessive drought of the season.

It had a summer's tilth the preceding year, to destroy all weeds that might be produced in the former crop, which was wheat *: during the winter it was again plowed, and twice more in the spring: it was intended to have given it another plowing † before it was sowed, to reduce it to a very fine mould, which is always reckoned best for grafs;

L

but

* Our correspondent's plowing this field the preceding summer, to destroy the weeds that might have risen in the wheat-flubble, was certainly very good husbandry, and could not fail answering his expectations: this plowing was, besides, of great service towards reducing the land into a fine tilth. O.

† This gentleman, with great judgment, allowed his field four plowings, and would have given it a fifth before sowing, had not the weather been wet. A little reflection will almost always make the affairs of a farm go well. It should be considered that a strong soil requires, at least, double the plowing that a light sandy one does; yet have we often known slovenly farmers lay down a stiff soil in oats and grafs-seeds, with only two slight plowings: the consequence has generally been a failure of one or the other, if not both of the crops. To such farmers we recommend our correspondent's practice. O.

but the rainy weather at that time prevented it, the soil being a strong clay, very retentive of wet for some time.

The land was made as level as possible, and then sowed with white oats, only three bushels * on an acre, contrary to the maxim of this county, where our farmers never sow less than four : this was designed with a view of preserving the grass-seeds, consisting of *rye-grass*, *trefoil*, *white Dutch-clover*, *rib or plantane grass*, and *hay-seeds* †, from being choked up by too great a crop of corn, which is often the case in wet seasons : the corn, growing rank, is soon laid by the violence of the wind and rain, to the total destruction of the grass, none being observed to grow where the corn is laid.

The season proving remarkably dry, I took a very particular, and almost, I may say, a singular method of helping my crop to rise in spite of the dry weather, so prejudicial to the grass.

At all events I fitted a trough, pierced with holes, to a water-cart, that contained sixty gallons, in the same manner as the streets in London are watered in the summer-time ; and a pond being contiguous to the field, my servant, with only one horse, watered the ground in five days time, and that only once over, which answered beyond expectation, giving convincing proofs of the utility of the scheme.

In

* Great advantages must, of course, result from sowing but a few oats for seed. Had it been sown thick, the crop of grass would have been either choked or starved ; but by this thin sowing, it received, during the spring-months, in its infant growth, all possible benefit from the dews, air, and sun ; and afterwards, when the sun's influence grew too powerful, and would have scorched it up, the oats branched and run to head, and, by shading the grass, protected it in its autumnal growth. R.

† Were we to find any fault with this gentleman's proceeding, it would be for sowing in the same field confusedly so many kinds of grass-seeds. We cannot enough recommend the sowing the best kinds distinctly and separately, cultivating them regularly, as we do our crops of corn. N.

In about a fortnight's time, the grain arose to a considerable height, shading and keeping cool the grafs underneath: by harvest-time several of the oat-straws measured from four to five feet in height; and the very next field, sowed with oats and grafs, failed considerably, none of the oats measuring more than two feet, and many under: the crop of grafs was entirely lost, and obliged to be plowed up again in the following winter.

The produce of my field, so managed, was thirty-two quarters* and two bushels of good oats, and would have yielded more, but I was obliged to make the stack in the field, not having barn-room at that time; and the double carriage afterwards to be thrashed (the wind having blown down the stack) contributed greatly to diminish the produce, or it had been larger.

The grafs proved very good, and a full crop: almost every other farmer lost their crops of grafs that season. I am convinced that watering the ground, which was done in July, the grain being sowed the April before, was the principal cause of so large a produce.

I am, GENTLEMEN,

Your most humble servant,

Nov. 23. 1763.

R. H——E,

In the North of Hertfordshire.

DRESSINGS

* This was indeed a very good crop, and we join with our correspondent in admitting a great efficacy in his watering. We should, however, have been glad if he had informed us, at what time of the year he watered his field; how many turns of his cart it took to an acre, or, in other words, how many turns his man went in a day; in what manner the field was manured for the preceding crop of wheat; and whether that grain was sowed on a fallow, or after beans, peas, or any other crop. We should be glad of another letter from this gentleman, explaining these particulars; and his future favours, on any other occasion, will greatly oblige us. N.

DRESSINGS for LAND,

MUSEUM RUSTICUM, November 1764. No. 59.

Account of a Meadow trench-ploughed to Advantage.

GENTLEMEN,

IT is not my design to make any parade of learning in this my address to you; I wish to be understood by the honest farmer, for whose use I chiefly write at present.

I have, Gentlemen, a moderate estate in a vale-country, which I occupy myself. I need not acquaint your readers with the nature of vale-lands in general; such of them as are intelligent, cannot but know that they are stiffish, deep, and rich.

A few years ago I had a meadow, which did not yield me so large a profit as I had reason to expect: it was a good blackish loam, rather stiff than light; but by the mismanagement of a former occupier, it was stocked with grasses of various kinds: some of them ripened their seeds early in the spring, others late in the summer; so that I never could get all the grass in a proper state of maturity at any one time to cut for hay.

This induced me to think of ploughing up my meadow, and converting it, at least for a course or two, into arable land.

It was some time before I could determine what grain first to sow it with, balancing long in favour of oats, which will yield a large crop, with little expence, on land newly broke up; but as I intended my second crop to be wheat, I did not chuse to sow oats first, as they are great drawers of land, and the soil of my meadow, though in very good heart, did not want to be impoverished.

Whilst I was hesitating what to do, a friend from Bucks came to pay me a visit, and when he heard my doubts, advised me to trench-plough it, and afterwards sow it, first
with

with barley, and then with wheat on the barley-stubble. Approving of what he said, I followed his advice; and in the beginning of the month of March I sent in a foot-plough with a broad share, and another foot-plough with a common share.

I had the land ploughed in the following manner.

My intention was to plough it in broad lands. The ploughman who held the first-mentioned plough, went first into the field, and drew a strait furrow, turning up a thin turf: when he had finished his bout, forming a low ridge, the other man, with the other plough, went in the same furrows and turned the earth to a considerable depth over the turf. In this manner they ploughed round the ridge till a broad land was formed, about ten paces wide; the second plough always following the first, in the same furrow.

After this method was the whole field turned over. I then let it lie about four days to sweeten the soil; at the end of which time I sowed barley, broad-cast, and harrowed it in.

As soon as the blade appeared above the surface of the ground, I passed a roller over the field, to close the earth about the roots of the plants, and lay the land smooth for the scythe.

By this husbandry I procured a very large crop of barley; how much I cannot exactly say, as I kept no account; but, just before it was mowed, I remember several judicious farmers estimated it at above fifty bushels the acre; and so much, at least, I really believe I had when it was all threshed.

My large crop of barley was not, however, the only advantage I procured by my experiment; for the turf was so thoroughly rotted by harvest, that in the first week in October I sowed it with wheat on one ploughing, and harrowed it in.

I used only ten pecks of seed on each acre, yet, at the harvest following, had a return of, at least, forty bushels *per acre*.

When I sowed the same field with barley for a first crop,

as already mentioned, I allowed twelve pecks of seed to each acre, and no more.

Where the depth of the soil will admit of it, I approve much of trench ploughing, as it raises a new mould, that has not, perhaps, ever afforded nourishment to annual plants, and therefore cannot be impoverished.

I am, GENTLEMEN,

Your humble servant,

West of London,

A PRACTICAL FARMER.

September 28. 1764.

PROFIT attending Arable and Pasture-land compared.

MUSEUM RUSTICUM, December 1764. No 74.

The Profit attending Arable and Pasture-land compared, as found by Experience, near Bury, in Suffolk.

GENTLEMEN,

THE following calculation of the different profit attending arable and pasture-land in my neighbourhood, you may, perhaps, think worthy a place in your *Museum Rusticum*, &c. since it is not drawn up merely from fancy, but from the exact accounts I have kept of my own crops, and the information I have gained from several sensible farmers.

I take twenty acres, and suppose them an addition to a farm; but I should premise, such an one as will require some additional cattle to be kept for it, perhaps two horses: but a farm of fifty pounds *per annum* may be so circumstanced as to require no material standing expences extraordinary for such an addition, in which case the ploughings, &c. will not cost near what I have laid them at; but the fairest way is the supposition I have made. We reckon nothing is either got or lost by four shillings *per acre* for a clean earth.

Calculation

Calculation of the Expences and Profit of farming a ploughed or pasture Field of twenty Acres for nine Years, on a supposition that it is not a Farm by itself, but an Addition to another of Fifty Pounds per annum, the Soil wet, and a loose, woodcock, brick Earth on the Surface, for eighteen Inches deep, and under that a very good stiff Clay, improved by Land-draining.

First Year, Fallow.

	<i>l.</i>	<i>s.</i>	<i>d.</i>
Rent charges - - -	15	0	0
First ploughing, a clean earth - -	4	0	0
Second <i>ditto</i> , ribbling it close overwart -	4	0	0
Harrowing it overwart - - -	0	5	0
Rolling - - -	0	3	0
Third ploughing, a roving - -	2	10	0
Fourth <i>ditto</i> , a clean earth - -	4	0	0
	29	18	0

Second Year, Barley.

Rent, &c. - - -	15	0	0
First ploughing, a clean earth - -	4	0	0
Harrowing down the ridges - -	0	5	0
Expences of mucking, at twenty loads <i>per</i> acre, and spreading the muck supposed to be at the farmer's house - - -	10	0	0
Second ploughing the sowing earth, as it may be done with a double breasted plough, to shut up the barks; that and the harrowing -	4	0	0
Seventeen coomb and two bushels of seed-barley, at eight shillings and six pence <i>per</i> coomb -	7	8	9
Two bushels and a half of clover-seed, at twenty- five shillings <i>per</i> bushel - -	3	2	6
Harrowing and water-furrowing -	0	10	0
Weeding - - -	1	0	0
Harvesting, two shillings and six-pence <i>per</i> acre	2	10	0

Carried forward 47 16 3

	<i>l.</i>	<i>s.</i>	<i>d.</i>
Brought forward	47	16	3
Threshing, one hundred and sixty coomb, at six-pence <i>per</i> coomb	-	4	0 0
Carrying out one hundred and sixty coomb, at eight times, eight pounds; but as back-carriage may sometimes be got, say	-	5	0 0
Expences eight times at market	-	1	10 0
	58	6	3

Third Year, Clover.

Rent, &c.	-	15	0 0
Cutting twenty acres, and harvesting it	-	3	0 0
Threshing thirty-two bushels of clover-feed, at four shillings <i>per</i> bushel	-	6	8 0
Expences of carrying the seed out, and at market	-	1	15 0
Weeding the clover	-	0	10 0
		26	13 0

Fourth Year, Wheat.

Rent, &c.	-	15	0 0
Ploughing, harrowing, and water-furrowing the clover-land, and sowing the wheat, five shillings and six-pence <i>per</i> acre	-	5	10 0
Ten coomb of seed	-	8	0 0
Weeding	-	1	10 0
Harvesting, including all expences, five shillings <i>per</i> acre	-	5	0 0
Threshing one hundred coomb	-	5	0 0
Carrying out <i>ditto</i> , at five goings, back-carriage three of them, and at market	-	3	0 0
Haulming, at one shilling and six-pence	-	1	10 0
		44	10 0

Fifth Year, Fallow.

Rent, &c.	-	15	0 0
Expences the same as the first year	-	14	18 0
		29	18 0

Sixth

Sixth Year, Wheat.

	<i>l.</i>	<i>s.</i>	<i>d.</i>
Rent, &c.	15	0	0
Mucking, the materials supposed to be in the farmer's yard	10	0	0
Ten coomb of seed blew-chaff wheat	7	0	0
Sowing earth	4	0	0
Weeding	2	0	0
Harvesting	5	0	0
Threshing one hundred and twenty coomb, at one shilling and two-pence <i>per</i> coomb	7	0	0
Carrying out <i>ditto</i> , at six times, as before	5	0	0
	55	0	0

Seventh Year, White Oats.

Rent, &c.	15	0	0
First ploughing, a clean earth	4	0	0
Water-furrowing	0	5	0
Second ploughing, a clean earth	4	0	0
Water-furrowing	0	3	0
Third ploughing, sowing earth, and harrowing	5	0	0
Twenty coomb of seed	8	0	0
Weeding	0	10	0
Harvesting, two shillings and six-pence <i>per</i> acre	2	10	0
Threshing one hundred and twenty coomb	3	0	0
Carrying out six times, and marketing	3	18	0
	46	6	0

Eighth Year, Tares and Turneps.

Rent, &c.	15	0	0
One clean earth, and harrowing ten acres for tares, and water-furrowing, and rolling	2	10	0
Five coomb of seed-tares	2	10	0
Cutting, making, loading, and stacking of fifteen loads of tare-fodder	2	0	0
Ploughing up the tare-land, a clean earth	2	0	0
Overwarting another clean earth	2	0	0
Carried forward	26	0	0

	<i>l.</i>	<i>s.</i>	<i>d.</i>
Brought forward	26	0	0
Roving it	1	5	0
First ploughing for turneps, ten acres, a clean earth	2	0	0
Second ploughing, drawing the ridges into barks	1	0	0
Third ploughing, ribbling it overwart	1	10	0
Harrowing it flat	0	2	6
Fourth ploughing, a clean earth; draw it on to the steach	2	0	0
Fifth ploughing, sowing earth, up-set it, and harrowing	2	5	0
Turnep seed	0	5	0
First hoeing, at four shillings <i>per</i> acre	2	0	0
Second <i>ditto</i> , at two shillings and six-pence	1	5	0
	39	12	6

Ninth Year, Wheat and Barley.

Rent, &c.	15	0	0
Ploughing and sowing the tare-land with wheat, water-furrowing, &c.	2	10	0
Five coomb of seed red-stalked wheat	4	0	0
Weeding	0	15	0
Harvesting	2	10	0
Haulming	0	15	0
Threshing sixty coomb	3	0	0
Carrying out <i>ditto</i> , &c.	2	10	0
Ploughing and sowing the turnep-land with barley, harrowing, rolling, and water-furrowing	2	10	0
Eight coomb of seed patney barley	3	4	0
Weeding	0	2	6
Harvesting	1	5	0
Threshing seventy coomb	1	15	0
Carrying out seventy coomb	1	10	0
	41	6	6

PRODUCE.

P R O D U C E.

First Year.

	<i>l.</i>	<i>s.</i>	<i>d.</i>
Sheep-feed worth . . .	1	10	0

Second Year.

One hundred and sixty coomb of barley, at eight shillings <i>per</i> coomb . . .	64	0	0
Shack for cattle . . .	2	0	0
	66	0	0

Third Year.

Feed of clover before it is seeded . . .	20	0	0
Thirty-two bushels of clover-feed, at one pound five shillings <i>per</i> bushel . . .	40	0	0
Feed after feed . . .	2	0	0
	62	0	0

Fourth Year.

One hundred coomb of wheat, at fifteen shillings <i>per</i> coomb . . .	75	0	0
Shack for cattle . . .	1	10	0
	76	10	0

Fifth Year.

Sheep-feed . . .	1	10	0
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Sixth Year.

One hundred and twenty coomb of wheat, at fourteen shillings <i>per</i> coomb . . .	84	0	0
Shack for cattle . . .	1	10	0
	85	10	0

Seventh Year.

One hundred and twenty coomb of white oats, at eight shillings <i>per</i> coomb . . .	48	0	0
Shack for cattle . . .	2	0	0
	50	0	0

Eighth

Eighth Year.		<i>l.</i>	<i>s.</i>	<i>d.</i>
Fifteen load of tares	.	15	0	0
Ten acres of turneps to buy cattle in, and fatten on them, to sell off in the spring, worth three pounds <i>per</i> acre	.	30	0	0
		45 0 0		

Ninth Year.				
Sixty coomb of wheat, at fourteen shillings and six-pence <i>per</i> coomb	.	43	10	0
Shack	.	0	15	0
Seventy coomb of barley, at seven shillings and six-pence <i>per</i> coomb	.	26	5	0
Shack	.	1	0	0
		71 10 0		

First Year.			Sixth Year.		
	<i>l.</i>	<i>s.</i> <i>d.</i>		<i>l.</i>	<i>s.</i> <i>d.</i>
Expences	29	18 0	Produce	85	10 0
Produce	1	10 0	Expences	55	0 0
Loss	28	8 0	Profit	30	10 0
Second Year.			Seventh Year.		
Produce	66	0 0	Produce	50	0 0
Expences	58	6 3	Expences	46	6 0
Profit	7	13 9	Profit	3	14 0
Third Year.			Eighth Year.		
Produce	62	0 0	Produce	45	0 0
Expences	26	13 0	Expences	39	12 6
Profit	35	7 0	Profit	5	7 6
Fourth Year.			Ninth Year.		
Produce	76	10 0	Produce	71	10 0
Expences	44	10 0	Expences	41	6 6
Profit	32	0 0	Profit	30	3 6
Fifth Year.					
Expences	29	18 0			
Produce	1	10 0			
Loss	28	8 0	Profit		

Profit.			Loss.		
	<i>l.</i>	<i>s.</i>	<i>d.</i>		<i>l.</i> <i>s.</i> <i>d.</i>
2d Year . . .	7	13	9	1st Year . . .	28 8 0
3d Year . . .	35	7	0	5th Year . . .	28 8 0
4th Year . . .	32	0	0	Loss of 2 Years	<u>56 16 0</u>
6th Year . . .	30	10	0		
7th Year . . .	3	14	0		
8th Year . . .	5	7	6		
9th Year . . .	30	3	6		
Profit of 7 Years	144	15	9		
	56	16	0		
	<u>87</u>	<u>19</u>	<u>9</u>	Total profit in 9 years ;	

which is nine pounds fifteen shillings and six-pence *per annum*, or nine shillings and nine-pence *per acre* *.

But I should observe, that as a crop of clover-feed is the most uncertain and various of any that is grown, I have reckoned less for it by far than multitudes produce, tho', at the same time, many bring nothing at all.

I know a field of twenty acres, which I have been often told by several who knew the crop, once produced the farmer five bushels *per acre*. It was all down on a Friday, and the farmer suspecting a change of weather, by great rewards to his workmen, and bringing casks of ale into the field, and feeding them well, tempted them to work in an extraordinary manner all the Saturday, and cleared the whole into barn. It began raining in the night, and so much succeeding bad weather came, that the crops were, in general, greatly damaged. His produced, as I said, one hundred bushels, all which he sold at three pounds ten shillings *per bushel*, arising to three hundred and fifty pounds. And a few years ago I saw the same field with a crop of clover, which did not produce twenty pecks, and that so wretched as to fetch nothing.

I read

* Nothing is reckoned for the straw, as it is supposed to be made into the muck.

I read this calculation to a farmer, and he observed, that I should reckon eighty bushels for the crop ; and as it is often grown, I will give you another total, with that alteration, that your readers may adopt either, according to their idea of the chance.

	<i>l.</i>	<i>s.</i>	<i>d.</i>
Profit, as above	-	-	- 144 15 9
Add 48 bushels at 60 l. ; but deduct 9 l. 12 s.			
for threshing at four shilling <i>per</i> bushel	-	<u>50</u>	<u>8 0</u>
		195	3 9
Loss	-	-	<u>56 16 0</u>
		138	7 9

which is fifteen pounds seven shillings and six-pence *per annum*, or fifteen shillings and four-pence *per acre*.

As I gave you, in one of my last letters, the course of the crops hereabouts, and which differs from the above account, I should observe to you, that I then supposed a good coat of manure to be laid on every other year : without such an assistance, those crops would be too much for such land as ours.

As I mention back-carriage in this calculation, I will explain my meaning. We generally carry our corn to Ipswich, Manningtree, or Thetford, from which places we load home with coals for blacksmiths, or any persons that want them, who pay us eighteen shillings for the carriage of a loading, twelve shillings *per* chaldron, and we generally bring one and a half. But as we may accidentally carry our corn where none is to be had, I make such allowances as to bring it near the truth.

Calculation of nine Years Expences and Profit of twenty Acres of Grass-Land, the Soil supposed to be the same as the above arable Land, with no other Difference than being Grass or ploughed.

First Year's Expences.		<i>l.</i>	<i>s.</i>	<i>d.</i>
	<i>l. s. d.</i>			
Rent, &c.	- - 15 0 0			
Mowing, making,				
and cocking ten				
	acres of grafs to hay at three shil- lings <i>per</i> acre, with beer - -		<u>1 10 0</u>	
	Carried forward	16	10	0

	<i>l.</i>	<i>s.</i>	<i>d.</i>
Brought forward	16	10	0
Stacking, loading, &c. of ten loads of hay - - -	1	10	0
Expences on four goings of hay when it is fold, weighing, and market - - -	0	16	0
<i>N. B.</i> Nothing is reckoned for carriage, as ma- nure is brought back.			

Fifteen old crones, bought in Au- gust - - -	3	15	0
Expences in buy- ing sheep - - -	0	4	0
Three cows at five pounds each -	15	0	0
A sow, and ten pigsthrce weeks old - - -	2	12	6
Supposing two a- cres to be ma- nured each year with twenty-six loads <i>per</i> acre, Forty loads of clay, at two-pence half-penny <i>per</i> load - - -	0	8	4
Twelve <i>ditto</i> of ashes, mortar, or rotten dung,			

	<i>l.</i>	<i>s.</i>	<i>d.</i>
brought from Bury; six wag- gon loads, at eleven shillings and six-pence <i>per</i> load - - -	3	9	0
Expences of car- rying it on, and spreading, &c. -	1	8	0
Turning and mix- ing manure -	0	4	0
	<u>45</u>	<u>16</u>	<u>10</u>

Second Year.

Rent, &c. - - -	15	0	0
Mowing, making, &c. of six acres of grafs - - -	0	18	0
Stacking, &c. six loads of hay -	0	18	0
Weighing, mar- keting, &c. - - -	0	10	0
Expences of buy- ing sheep - - -	0	1	6
A score of old crones - - -	6	0	0
Manuring two a- cres as above	<u>5</u>	<u>9</u>	<u>4</u>
	28	16	10

Third Year.

Rent, &c. - - -	15	0	0
Mowing and ma- king, &c. eight acres of grafs, at three shil- lings <i>per</i> acre	<u>1</u>	<u>4</u>	<u>0</u>
Carried forward	16	4	0

	<i>l.</i>	<i>s.</i>	<i>d.</i>		<i>l.</i>	<i>s.</i>	<i>d.</i>
Brought forward	16	4	0	Expences on cat-			
Stacking, &c. .	1	4	0	tle . . .	0	3	0
Weighing and				Fifteen crones .	3	7	6
marketing, &c.	0	12	0	Manuring two a-			
Expences on cat-				cles as above	5	9	4
tle . . .	0	2	0		27	15	10
Fifteen crones .	3	15	0				
Manuring two a-							
cles as above	5	9	4				
	27	6	4				

Fourth Year.

Rent, &c. . .	15	0	0
Mowing and ma-			
king twelve a-			
cles, at three			
shillings <i>per</i> a-			
cre . . .	1	16	0
Stacking, &c. .	1	16	0
Weighing and			
marketing .	0	18	0
Expences on cat-			
tle . . .	0	5	0
Fifteen crones .	4	0	0
Manuring two a-			
cles as above	5	9	4
	29	4	4

Fifth Year.

Rent, &c. . .	15	0	0
Mowing and ma-			
king ten acres	1	10	0
Stacking, &c. .	1	10	0
Weighing and			
marketing .	0	16	0

Sixth Year.

Rent, &c. . .	15	0	0
Mowing and ma-			
king nine acres	1	7	0
Stacking, &c. .	1	7	0
Weighing, &c. .	0	14	0
Expences on cat-			
tle . . .	0	4	0
Fifteen crones .	4	5	0
Manuring two a-			
cles as above	5	9	4
	28	6	4

Seventh Year.

Rent, &c. . .	15	0	0
Mowing and ma-			
king twelve a-			
cles . . .	1	16	0
Stacking, &c. .	1	16	0
Weighing, &c. .	0	18	0
Twenty crones	5	0	0
Expences on cat-			
tle . . .	0	5	0
Manuring two a-			
cles as above	5	9	4
	30	4	4

Eighth Year.

Rent, &c. . .	15	0	0
Carried forward	15	0	0

d.

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4

4

0

0

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4

4

0

0

0

l. s. d.

Ninth Year.

l. s. d.

Brought forward	15	0	0				<i>l.</i>	<i>s.</i>	<i>d.</i>
Mowing and ma-				Rent, &c.			15	0	0
king eight acres	1	4	0	Mowing and ma-					
Stacking, &c.		1	4	king ten acres			1	10	0
Weighing, &c.		0	10	Stacking, &c.			1	10	0
Twenty crones		5	10	Weighing, &c.			0	8	0
Expences		0	7	Twenty crones			3	15	0
Manuring two a-				Expences on cattle			0	10	0
cres as above		5	9						
							22	13	0
		29	4						
		4	4						

P R O D U C E.

First Year.

l. s. d.

Ten loads of hay, wasted to eight, and sold in the winter at two pounds <i>per</i> load	16	0	0
Fifteen old crones sold fat, with their lambs, at fifteen shillings <i>per</i> couple	11	5	0
As no expences are calculated for the dairy, such as wood, utensils, &c. I shall lay the clear profit of the cows at four pounds each, which is what I have generally made of mine, every thing paid, and yet kept a calf now and then for stock: one I reckon this year	12	0	0
I shall not explain all the method of managing the hogs, but lay the clear profit of a sow at different sums, such as I have generally found my own produce	6	0	0
	45	5	0

Second Year.

Eight loads of hay wasted to seven, and sold at two pounds <i>per</i> load	14	0	0
Twenty crones, sold fat at seventeen shillings <i>per</i> couple	17	0	0
Three cows, at four pounds each	12	0	0
One sow	6	5	0
	49	5	0

N

Third

Third Year.		<i>l.</i>	<i>s.</i>	<i>d.</i>
Ten loads of hay, wasted to eight, sold at two pounds <i>per</i> load	.	16	0	0
Fifteen crones, sold at fifteen shillings <i>per</i> couple		11	5	0
Four cows, the new one at three pounds (the calf is now a cow)	.	15	0	0
One sow	.	6	10	0
		48	15	0

Fourth Year.				
Fourteen loads of hay wasted to twelve	.	24	0	0
Fifteen crones, sold <i>per</i> couple at fifteen shillings		11	5	0
Four cows, the new one three pounds five shillings		15	5	0
One sow	.	7	0	0
		57	10	0

Fifth Year.				
Twelve loads of hay, wasted to ten	.	20	0	0
Fifteen crones, sold <i>per</i> couple at sixteen shillings		12	0	0
Four cows, the new one at three pounds ten shillings	.	15	10	0
One sow	.	5	0	0
		52	10	0

Sixth Year.				
Ten loads of hay, wasted to eight	.	16	0	0
Fifteen crones, sold <i>per</i> couple at sixteen shillings		12	0	0
Four cows	.	16	0	0
One sow	.	7	10	0
		51	10	0

Seventh Year.				
Fourteen loads of hay, wasted to twelve	.	24	0	0
Twenty crones, sold <i>per</i> couple at seventeen shillings	.	17	0	0
Four cows	.	16	0	0
One sow	.	5	0	0
		62	0	0

Eighth

Eighth Year.

l. s. d.

Twelve loads of hay, wasted to ten	. 20	0	0
Twenty crones, sold <i>per</i> couple at sixteen shillings	16	0	0
Four cows	. 16	0	0
One sow	. 5	15	0

57 15 0

Ninth Year.

Twelve loads of hay, wasted to ten	. 20	0	0
Twenty crones, sold <i>per</i> couple at fourteen shillings	. 14	0	0
Four cows	. 16	0	0
One sow	. 7	0	0

57 0 0

Expences.

l. s. d.

1st Year . .	45	16	10
2d Year . .	28	16	10
3d Year . .	27	6	4
4th Year . .	29	4	4
5th Year . .	27	15	10
6th Year . .	23	6	4
7th Year . .	30	4	4
8th Year . .	29	4	4
9th Year . .	22	13	0

269 8 2

Produce.

l. s. d.

1st Year . .	45	5	0
2d Year . .	49	5	0
3d Year . .	48	15	0
4th Year . .	57	10	0
5th Year . .	52	10	0
6th Year . .	51	10	0
7th Year . .	62	0	0
8th Year . .	57	15	0
9th Year . .	57	0	0

481 10 0

269 8 2

212 1 10

Which is twenty-three pounds eleven shillings and two-pence *per annum*, or one pound three shillings *per acre* profit.

The above account, gentlemen, displays the vastly superior advantages of grafs, with us, to arable land.

You will certainly remark, that nothing in the above account is reckoned for losses of stock ; but in answer to that I should observe, that nothing is calculated in the arable account

account for some bad years, when in such land not a quarter of a crop is produced : and I do not mean this calculation as perfect, (that is impossible), but only to discover the *proportion* between the one method and the other ; and from what I have observed, and gathered from the information which the most intelligent farmers can give me, I am clearly of opinion, that the chances, on the whole, are much in favour of the grass-land, the crop of hay and seed being much more regular than those of corn, clover, or turneps ; and supposing the eighty bushels of clover-feed, yet the grass-profit far exceeds the arable, even then ; but, as I observed, the probability lies against the latter, supposing the profit to be only fifteen pounds fourteen shillings and eight pence *per annum*.

I may remind you, that I supposed this twenty acres to be an addition to a farm, not one by itself, and so compared the respective profits ; therefore I have not allowed any thing for the seed which the above-mentioned cattle may accidentally have on the arable land, or turneps which they may expend in the winter ; and for this reason, because, although it appears to me that grass is the most profitable husbandry, yet a certain quantity of ploughed land should undoubtedly be a part of every grass-farm, for the raising turneps, some artificial grass, and stover enough for the winter's food.

I hope your readers will peruse this calculation with candour, and believe me, when I assure them it is the nearest the truth of any I can make, either from my own experience, or best information. If any doubts or objections are made to it, I shall be ready, in a future Number, to explain my meaning more precisely.

The three last years I could have reckoned two steers fed on the grass ready for turneps in the winter, and in some other articles I have underlaid the matter, I am certain, greatly, lest the want of winter-stover should be an objection.

I reckon the hay all sold at forty shillings ; whereas it is scarce ever in nine years less than that, and frequently fifty
or

or sixty shillings : but I think no objection can be made in this respect, as when I calculate the profit of the grafs-land I have at present, I never think of doing it otherwise than in the manner above, as such is the profit arising from my having such a quantity of grafs, and which I could not make of any ploughed land without the grafs. If all my arable fields were employed in growing clover for a very large quantity of grafs, the profit would be five times as large as from raising corn in the common course of husbandry about us *.

I am, GENTLEMEN,

Your constant reader,

Bradfield, near Bury,

Y.

Nov. 6. 1764.

P. S. I forgot some rollings of the pasture, at two pence per acre.

PROFIT attending Arable and Pasture-land compared.

MUSEUM RUSTICUM, March 1765. No 46.

Examination of the preceeding Estimate.

GENTLEMEN,

ON perusing the letter, Numb. 74. signed Y, respecting the profits arising from the different manner of occupying

* We may venture to observe, that the corn, in the estimate of the profits of tillage, is valued at a low rate ; but, perhaps, it was cheap when the valuation was fixed ; and allowances may be made in any future estimate on this plan, which we recommend to the notice of our readers, as containing a comprehensive view of the comparative profits of the tillage farmer and grazier. E. R.

cupying land, I observed some articles brought to the profit of the feeding account, which I cannot reconcile, and therefore would desire your correspondent to set me to rights (if I am wrong) respecting it, as an error can be of no advantage to any one.

I observe, in every year's account of produce, all the hay, which appears to be mowed in each year, is sold; therefore I should be glad to know what the cows were foddered with in winter, and on how much of the twenty acres such fodder grew.

I also observe the clear profit accruing from a cow to be valued at four pounds *per annum*; in which I apprehend all that came from her to be included, except now and then a calf, as is noticed. If this be the case, (as nothing appears to the contrary), it would also be satisfactory to know with what part of the produce of the twenty acres of land the pigs were fed, as I suppose there was no corn on it of spontaneous growth, and it is apprehended, that grass alone is not sufficient for hogs to thrive on.

The clearing up these matters may be of some consequence to us dairy-farmers, as they appear to be considerable articles in the annual produce, and from which the profits attending the nine years productions of the twenty acres in question are, I apprehend, more than half increased.

If the estimate referred to be verified, I will venture to say, on behalf of myself and several of my acquaintance, that such profit is greater than any which has been made in these parts; and therefore should think the public and ourselves greatly indebted to the editors, could a particular detail of the manner of proceedings in the management of the cows and hogs be obtained of the author of that letter, so as to oblige us with it in some future number of your *Museum Rusticum* *.

For my own part, I have been in a dairy of from forty to sixty cows and upwards, near thirty years, and, having
diligently

* See p. 103.

diligently observed the produce, could never yet find that two pounds *per cow* could be netted *per annum*, and the pigs included.

It is customary for many dairies to be rented by the cow, from three pounds to four pounds *per cow per annum*, by dairy-farmers; but then the proprietor of the cows finds houses for the tenant, and food for the cattle, both summer and winter.

The clearing up this point will be of the greater importance, as some persons, who may see the said estimate, may implicitly believe it to be exactly calculated, and in future leases to their tenants prevent the continuing so much land to corn; which will tend to much national disadvantage, as agriculture is, and ever will be, that art on which the greatest dependence is, and from which the most staple commodities must proceed, to wit, corn and wool.

I am,

A well-wisher to all improvements,

RURICOLA GLOCESTRIS.

L.

PROFIT attending Arable and Pasture-land compared.

MUSEUM RUSTICUM, April 1765. No 63.

An Answer to Ruricola Glocestris, in which is contained an Estimate of the Expences and Profit of a Dairy of four Cows.

GENTLEMEN,

RURICOLA GLOCESTRIS I perceive has, in page 101. expressed some doubts of my estimate of the profit of grass-lands, and desires, if he is wrong, I would set him to rights. That he wants to be set to rights in his dairy-notions, or the county of Gloucester

ster in its practice of farming, I am sure, is, from his letter, very evident.

Whenever any of your correspondents express their doubts of my estimates and calculations, or any other parts of my letters, I shall always, with the greatest readiness, explain any thing obscure, or which to *some* of your correspondents may appear *suspicious*.

I cannot do this in the present case, in any way so well as by laying before you an authentic account of the expences and produce of my own dairy.

I shall premise, that I have it already extracted from my account books into a register of all my farming-experiments, which I regularly insert. I shall also subjoin a few observations on it, which I had before annexed to the account.

If my friend Ruricola, or any other gentleman that *doubts* of my calculation, &c. should accidentally come into Suffolk, he may convince himself, that Y. practises what he writes of; and I would freely shew him my ledger, containing the articles of the following account: I think I cannot give any gentleman more satisfaction.

EXPERIMENT. 1763.

Food, Produce, and Expences of a Dairy of four Cows in a Year.

THEIR food, four small pastures, amounting to sixteen acres, or thereabouts. Two of them I fed in the spring, rather late before I shut them up for hay: another, of six acres, the cows had to themselves till the others were mown; and then I shut that up for a rowen (after-mass) crop of hay, cutting it the twentieth of August.

Therefore they had first that of six acres, another of two acres, which is common for all my cattle, being never mown; next a five-acre piece, after the hay was cleared from it, and then the other field of three acres: besides which, they ran four days in my clover, till, finding the butter tasted, I took them out.

It

It will appear also by the following account, that they eat in winter one ton and seven hundred weight of hay, and two loads and a half of straw bought for them, besides their share of some which grew on my farm, the whole of which (soft corn-straw) amounted only to five acres of oats for them and four horses too; the chief of my lands lying that year fallow.

E X P E N C E S.

	<i>l.</i>	<i>s.</i>	<i>d.</i>
1763. April 27. For two hundred weight of hay	0	5	0
August 8. Twenty-five <i>ditto</i>	1	17	6
Nov. 30. A load of straw	0	14	0
Dec. 30. Half a <i>ditto</i>	0	5	0
1764. Feb. 15. <i>Ditto</i>	0	3	0
Feb. 20. A load <i>ditto</i>	0	11	0
Sundry expences, <i>viz</i> pans broke in dairy, cheese-cloths, brushes, brooms, salt, &c. came exactly to	0	10	10
	4	6	4

In the above account is included nothing for firing, which cost me very little, as the small bush-faggots, which I grub up on borders of fields to clear them for the grass to grow, completely served my dairy this year: these are difficult of sale, fetch but little, and must be rooted up if no cows are kept.

The cook in the family managed as dairy-maid: there are in this respect great disadvantages in only keeping four cows, if a dairy-maid is also kept to attend them; for she may manage (and they do in this neighbourhood more in proportion) eight or ten cows, as well as four, which alters the proportion of the expence greatly; and in firing it is but a small addition of wood to the addition of four or five cows. And Ruricola should remember, (a circumstance which he seems to have forgot), that I stated the twenty acres of grass, not as a farm by itself, but expressly as an addition to one of fifty pounds *per annum*.

O

P R O.

P R O D U C E		<i>l.</i>	<i>s.</i>	<i>d.</i>
Butter, milk, and cream, used in the family; the butter six-pence <i>per</i> pound, the cream six-pence <i>per</i> pint, the milk one half-penny <i>per</i> pint (the market-prices)	.	9	4	8
Seven hundred and sixty pounds of cheese, sold at two-pence half-penny <i>per</i> pound	.	7	8	6
The value of two yearlings, kept for stock (valued by a farmer, who offered to take them at the price)	.	3	10	0
Two sucking calves, sold at	.	0	15	6
		4	5	6
		20	18	8
Deduct expenses	.	4	6	4
Profit, four pounds three shillings <i>per</i> cow,	.	16	12	4

I will now venture to assert, that a notable farmer's wife would have made five pounds *per* cow; for, if Ruricola has been used to a dairy, he must be sensible of the difference between one kept merely for convenience, under a servant's management, and a farmer's.

I am totally ignorant of every thing concerning a dairy; which will prevent my ever keeping many cows.

I can assure him of the exactness of the above account in every respect but what relates to servants; and that point is absolutely against him, for he may be sure I know every thing *in favour* of the dairy; therefore, if there was any negligence in it, it makes good my assertion, that farmers make much more of it than gentlemen can, as their wives are constantly at the elbow of the maid.

EXPERIMENT. 1764.

Food, Produce, &c. of four Cows a Year.

Pastures the same as the last year. Turned them into an acre of the five-acre field the sixteenth of May, besides which, they had the three acres to themselves. Mowed this

this year the six acres, and the remaining four of the five acres. No clover.

EXPENSES.

1764.	<i>l.</i>	<i>s.</i>	<i>d.</i>
April 26. and May 8. Cloths, pans, brushes, salt, &c.	0	8	10
Faggots for firing	1	10	0
Eighteen hundred weight of hay	2	5	0
Half a load of straw	0	6	0
May 6. Four hundred weight of hay	0	10	0
July 1. and August 6. Salt, cloth, lead, mend- ing brooms, &c.	0	5	10 $\frac{1}{2}$
October 10. For sundries	0	9	2
	5	14	10 $\frac{1}{2}$

The fire-wood was most of it this year brush-faggots out of a wood, and but few of the small bush-faggots: I am therefore enabled better to calculate their value. Besides the straw bought, they had what was to spare of my farm.

PRODUCE.

1764.	<i>l.</i>	<i>s.</i>	<i>d.</i>
June 14. Three calves, sold to the butcher,	3	6	0
Aug. 18. Seven pounds and a half of butter	0	3	9
Nov. 1. For two hundred and thirty-eight pounds of butter made to October 22.	6	4	9 $\frac{1}{2}$
For four hundred and seventy-three pounds of cheese, at two-pence half penny <i>per</i> pound, made to the end of August	4	18	6 $\frac{1}{2}$
For milk and cream to October 22.	1	11	6
March 1. For eighty-two pounds of butter from October 22. to January 17.	2	8	0
For milk and cream to February 14.	0	10	6
For two hundred and thirty-six pounds of cheese, eighty at two-pence half-penny,			
Carried forward	19	3	1

	<i>l.</i>	<i>s.</i>	<i>d.</i>
Brought forward	19	3	1
and one hundred and fifty-six at two-pence <i>per pound</i>		2	2 8
Sold two heifers, the last year's yearlings, for	7	0	0
Valued, &c. at then	4	5	6*
		2	14 6
		24	0 3
Expences		5	14 10 $\frac{1}{2}$
Profit, four pounds eleven shillings <i>per cow</i> ,	18	5	4 $\frac{1}{2}$

I think these two accounts (not calculations) must be satisfactory to your correspondent Ruricola; and he, doubtless, observes nothing is yet said of hogs in the above. I have reckoned not a farthing for all the flet milk, and whey: these were given my hogs, of which more by and by.

I think I have cleared up the mystery of the cows: I shall now add some observations which I had annexed to the account of my cows for 1763, as follows.

There are some very material observations to be made on this account. Is four pounds three shillings the value of a cow's feed a twelvemonth? Surely not. Two steers, or heifers, may be kept and fatted in the place of one cow: these will undoubtedly pay better.

I am aware of the objection, that a dairy is never supposed to answer well without a good dairy-wife to do all the business of it. This certainly makes a material alteration: but four pounds a cow is, in this neighbourhood, thought pretty near the profit of one, at least as farmers wives *own*. Yet it must be evident, if there was no further consideration, a dairy must be attended with constant loss: this

* Our correspondent in this place seems to have made a small mistake, as they were valued only at three pounds ten shillings. E.

this consideration is the advantage derived from the hogs, which evidently composes the whole profit of a dairy.

I am not yet able, from experiments, to assert how many hogs may be kept on a given number of acres without the aid of a dairy: this is necessary to be known before the exact profit of cows can be ascertained. The spring-litters stand greatly in need of the milk and whey, which is then coming on; so that few, I doubt, could be bred at that time of the year without them.

I shall, every year, make all the observations I can on the feeding of them, to be able to judge better for the future.

How contrary to Ruricola's notions are mine! Were it not for the hogs, I would have nothing to do with a dairy, with four pounds profit *per* cow. He is contented with forty shillings, hogs (or pigs, as he calls them) included.

I speak from experience, and know well that grazing, were it not for the hogs, would be more profitable than four pounds *per* cow.

I come now to speak of my hogs; and in this point, like the last, I shall quote a page or two from my manuscript register of experiments.

EXPERIMENT. 1763.

Food and Produce of a Sow, and the Pigs bred by her, in a Year.

She pigged in April seven pigs, and in October eleven.

EXPENSES.

1763.	l.	s.	d.
Nov. 18. For two coomb of drains *	0	1	4
Cutting a litter	0	1	6
Dec. 8. and Jan. 21. Ten coomb of peas .	5	1	0
Expences on <i>ditto</i>	0	1	0
For ten bushels of barley	1	0	0
Feb. 17. and 25. Expences in selling .	0	11	6
For nine coomb of drains, and expences	0	7	6
For two coomb and two bushels of peas .	1	6	3
March 12. Drains	0	1	6
	8	11	7

* Or grains, as they are frequently called. E.

P R O D U C E.

	<i>l.</i>	<i>s.</i>	<i>d.</i>
Oct. 30. A sucking pig . . .	0	2	3
A fat roasting hog . . .	1	9	0
A fat hog, one hundred and ten pounds weight	1	12	9
Feb. 17. <i>Ditto</i> , one hundred and sixteen pounds weight, at four shillings and ten-pence per stone *. . .	2	0	0
Heads, &c.	0	5	3
Feb. 22. Three fat hogs, fold alive . . .	6	7	0
One <i>ditto</i> , at four shillings and ten-pence per stone	2	0	0
Ten live pigs, carried to next year's account, valued at	4	16	6
	18	12	9
Expences	8	11	7
Profit	10	1	2

The dairy this year was four cows : all the whey and flet milk was thrown into the hogs cistern, together with the dish-wash and offal of the kitchen, and the drains of about twenty coomb of malt used in the family, besides which, thirteen coomb more I bought for them : all this composed their common wash while lean : for three months in the summer, the sow and the seven pigs ran in my clover. These articles, besides common grafs, (on which, by the by, they feed as well as sheep), were all their lean food.

Now, from the above account must be deducted the value of the clover feed, as that certainly was not from grafs-ground, and may be estimated. Such deductions I have no objection to, as we may come near the mark in valuing : my calculation, however, does not require them, as the twenty acres were to have been an addition to a farm, not one by itself.

	<i>l.</i>	<i>s.</i>	<i>d.</i>
Seven hogs, at fourteen-pence <i>per</i> week, for three months, come to ——— ———	0	14	0
Thirteen coomb of drains ——— ———	0	10	4
	1	04	4
But			

* By the stone is, we presume, here meant fourteen pounds. E.

But let Ruricola state these two articles at two pounds one shilling and two-pence if he pleases; the propriety of the sums mentioned in my calculation for the profit of a sow will not be impeached thereby.

E X P E R I M E N T. 1764.

Food, Produce, &c. of Hogs a Year, maintained by a Dairy of four Cows.

The old sow pigged in April, eleven, and again in November, twelve; the young one seven, in January, 1765.

E X P E N C E S.

1764.			l.	s.	d.
	Ten pigs, from last year's account, to be reckoned here	—	4	16	6
May 6.	For eighteen coomb of drains	—	0	13	2
19.	For two coomb of shorts *	—	0	4	0
	For seven coomb and two bush. of drains		0	5	6
May 19.	For a young sow and boar	—	1	4	0
28.	For eighteen coomb of drains	—	0	12	8
July 2.	For two bushels of shorts	—	0	1	0
19.	For four coomb <i>ditto</i>	—	0	8	0
Aug. 23.	Expences in felling	—	0	5	0
	For two bushels of oats	—	0	4	0
Oct. 12.	For five coomb of drains	—	0	2	11
	Sundry expences	—	0	1	6
Nov. 1.	For one coomb of shorts	—	0	2	0
13.	For two bushels <i>ditto</i>	—	0	1	0
	Expences in felling	—	0	3	5
24.	For one coomb of shorts	—	0	2	0
Dec. 17.	For one bushel <i>ditto</i>	—	0	0	5
22.	For three bushels † <i>ditto</i>	—	0	4	6
28.	For tail barley	—	0	14	3
	Carried forward		10	5	10

* Cribble. Y. ——— We imagine our correspondent means malt-dult. E.

† Does not Y. hear mean three coomb, or twelve bushels? E.

			<i>l.</i>	<i>s.</i>	<i>d.</i>
1764.	Brought forward		10	5	10
29.	For Grinding <i>ditto</i>	—	0	0	6
Jan. 3.	For bran	—	0	1	6
	Cutting pigs	—	0	1	6
	8. For sixteen coomb of drains	—	0	10	8
	12. Grinding barley	—	0	1	0
	30. Six coomb of drains	—	0	4	0
	25. For six bushels of barley	—	0	14	3
Feb. 1.	Grinding	—	0	1	3
	22. For two coomb of shorts	—	0	4	8
	27. For one hundred and twenty bushels of turneps, and five bushels of cabbages; fay one hundred and twenty five bushels of turneps	—	0	6	0
<i>N. B.</i> My crop of turneps this year produced eight bushels <i>per</i> rod (their root and top cut off) : one hundred and twenty-five bushels is therefore sixteen rods, which, at two pounds two shillings <i>per</i> acre, the price this year, comes to four shillings; but I have said six shillings.					
Feb. 27.	A man boiling turneps	—	0	0	9
	For five bushels of coals, at three times,	—	0	5	5
March 2.	For ten coomb of drains	—	0	6	8
	Expences	—	0	0	6
	For one coomb of shorts	—	0	2	4
	6. <i>Ditto</i>	—	0	2	4
	8. A man boiling	—	0	1	0
	Coals	—	0	2	0
			13	12	2
Three months feed in clover					
			0	12	0
			14	4	2

P R O.

P R O D U C E.

		<i>l.</i>	<i>s.</i>	<i>d.</i>
Aug. 22. Sold eleven pigs, lean, for	—	5	15	0
Nov. 13. Sold nine lean *	—	12	3	0
March 25. Value of stock carried to next year, (the old sow excepted), viz. the young sow, (one of the ten), with six pigs	— 2 12 6			
Twelve pigs	— 5 8 0			
A little sow with pig, (bought May 19.)	— 1 5 0			
The boar	— 1 1 0			
	—	10	6	6
		28	4	6
Expences	—	14	4	0
Profit	—	14	0	6

Before I make any observations on this account, I shall explain the price I charge for clover-feed.

I am enabled to do it very clearly this year, as I had none of my own, but hired a field of two acres and three rood, at one pound thirteen shillings *per* acre, from May to Michaelmas. I hired it purposely for my horses, but kept the ten hogs in it for three months.

The price of the clover was four pounds ten shillings and six-pence. The cattle it fed were

- Five horses, three months;
- Ten hogs, three months;
- Thirty-eight sheep and lambs, one month;
- Two heifers, two months.

The common price of joisting * a horse is one shilling and six-pence *per* week in clover; but that I may raise the price for the hogs, I will reckon the rest of the cattle as low as possible.

P

Five

* Or giving pasture to. E.

	<i>l.</i>	<i>s.</i>	<i>d.</i>
Five horses, say at three shillings and six-pence <i>per</i> week, for three months	—	—	2 2 0
Thirty-eight sheep and lambs, at two-pence <i>per</i> couple, for one month	—	—	1 5 4
Two heifers, at three-pence <i>per</i> week each, for two months	—	—	0 8 0
The hogs	—	—	0 12 0
			4 7 4

This comes as near the truth as any calculation I can make; and I can every year, by hiring clover, keep my hogs as cheap as this, without any assistance from arable land of my own.

The above account of the profit of hogs surely displays the inattention of Ruricola, or the folly of the Gloucestershire farmers; and I apprehend he will not now suppose that *corn grew spontaneously* in the twenty acres of grafs I calculated, or that the profit of the nine years is *more than half increased*. And when he remembers, that the accounts I have stated relate to seventeen acres, and the calculation was twenty, I apprehend I have answered him fully.

I cannot but observe, that it is extremely unfair to criticise my calculation as a farm by itself, when I suppose it to be an addition to one of fifty pounds *per annum*; which circumstance would alone be answer sufficient to a farmer who is so wretchedly situated as to be contented with forty shillings a year profit on a cow, pigs included.

Ruricola cannot, I imagine, reckon the rent of his grafs to his cows, as he surely must keep other cattle as well as them; and then the rent should be deducted from the total, in the manner of my calculation.

However, Mr Ruricola has given me such a specimen of the Gloucestershire farming, that I should not be surprised if they keep neither sheep nor horses, nor make any hay.

I remain, GENTLEMEN,

Bradfield,

Your constant reader,

April 4. 1765.

Y.

PROFIT

PROFIT attending Arable and Pasture-land compared.

MUSEUM RUSTICUM, June 1765. No. 94.

On the Profits attending a Dairy.

GENTLEMEN,

I Embrace with pleasure an opportunity of returning my thanks to the author of the paper, Numb. 63. page 103. signed Y. for his readiness to communicate his experience in the subject desired, from which, I make no doubt, some instruction may be gained; and indeed, gentlemen, so open and generous a practical correspondent as Y. cannot fail adding merit to your publications, as often as he may be so obliging as to communicate his experimental knowledge in farming affairs, on which, it is very clear, he has made some very judicious remarks, which, if attended to, may be of service to the practical farmer; for certainly matters of fact, grounded on experience, are most valid, and are greatly to be preferred to speculative knowledge.

The account in his letter of the expences and productions attending four cows, I believe, is very just, as do I also that of the pigs; but I do not apprehend that it any ways tends to prove my assertion untrue, or justly to impeach our practice, in these parts, of managing a dairy: for, from the calculation of the nine acres profit of the grazing made in Num. 74. p. 86. I observed, that, on an average, *communibus annis*, (one year with the other), there were eight acres and a half mowed; so that there were appropriated to the four cows and old ewes (crones) wholly,

	<i>l.</i>	<i>s.</i>	<i>d.</i>
Eleven acres and a half, at fifteen shillings <i>per</i> acre, is	-	8	12 6
Eight acres and a half of after-grass, at seven shillings and six-pence <i>per</i> acre, for the remainder of the year after being mowed	-	3	3 9
Carried forward	11	16	3

	<i>l.</i>	<i>s.</i>	<i>d.</i>
Brought forward	11	16	3
Deduct for the ewes winter-feed, (for seventeen, the average in the nine years) at four shillings <i>per</i> head, - - -	-	3	8 0
To be charged to the annual expence of four cows - - - - -	-	8	8 3
Expences attending the winter-feed of the said four cows, as it does not appear any part thereof grew on the twenty acres; the average of two years is - - -	-	5	0 7½
One year's expence attending four cows, <i>per</i> Y.'s own accounts, - - -	-	13	8 10½
The produce, <i>per</i> same accounts, on an average of two years, is - - -	-	22	12 2½
Nett profit on four cows for one year, <i>per</i> Y.'s own account, - - -	-	9	3 4½

Thus it appears, admitting Y.'s two accounts of expences to be for two years. But notwithstanding the appearance, these two sums of four pounds six shillings and four-pence, and five pounds fourteen shillings and ten-pence half-penny, have of being the expence attending four cows two winters; yet I think, that from April 27. 1763, to May 6. 1764, includes but one; and in which time it may be reasonable to apprehend the hay and straw therein mentioned were consumed for fodder, (except the two hundred weight of hay in the first *item*, which, it is very probable, completed the feed of the preceding winter), as it does not appear any remained in stock; and that the one pound ten shillings, charged for firing, was also used in that time: therefore, if the first article of eight pounds ten

l. s. d.

ten shillings, and the two last, amounting to fifteen shillings and one half-penny, in the expences of 1764, be rejected, all the others, which are divided into two experiments, may very justly be looked on to be but one year's expence, and amount to - - - 8 12 4

Which being added to the rent - - - 8 8 3

Makes the expences attending four cows one year, exclusive of labour, - - - 17 0 7

Deduct this from the average produce on two years, amounting to - - - 22 12 2½

Nett profit on four cows for one year is - 5 11 7½

which is one pound six shillings and seven-pence three farthings *per cow per annum*, the whey and butter-milk excepted, which, from a cow, can be no great quantity; for, in the account of produce, I observe, that the cheese, in the year 1763, was sold for two-pence half-penny *per pound*, and in 1764, for two-pence half penny, and some for two-pence *per pound*, a price in those years (the scarcity of the article considered) which indicates it to be not of the best sort, but what is with us called half cowherd-milk * cheese, that is, the night's milk skimmed (fleeted) and the morning's milk fresh from the cow, mixed together, and from which method nothing could be for the pigs from it but whey, and what butter-milk came from the cream of half the milk, which amounts to very little from four cows only; therefore the profits arising from pigs seem evidently to be from something else beside the pasture-land only, as neither grains (drains), peas, barley, gurgins, (shorts), bran, oats, turneps, cabbages, or clover grew thereon, and all of which, it appears from the accounts, were made use of in feeding the pigs.

Hence,

* Implies milk as received from the hand of the cowherd, a person whose office is to attend upon, and look after, the herd of cows in places where they run in commons. RURICOLA.

Hence, I think, it is clear what I asserted is true, with respect to the profit attending a cow in this county, even if the first account only be admitted, especially when the difference in distance from the metropolis is considered; as our cheese, of the above sort, sold, in 1763, for about twenty shillings *per* hundred weight, and in 1764, about eighteen shillings *per* hundred weight, on an average; and that the twenty acres in question were an addition to a farm, for which reason no account of labour is taken, as it is supposed no *extra* servants were necessary.

And, I think, from what is above observed, it helps to strengthen my assertion, that agriculture is that art on which the greatest dependence is to be had, and that it appears to be most profitable to the farmer.

With respect to inattention, I cannot yet charge myself therewith in this affair, though I may, perhaps, with folly, in taking any notice of a calculation which so evidently contradicts itself; nor have I any need to suppose corn grew spontaneously on the pasture-land, since, from the accounts, it is very evident the hogs were fed with grains, peas, barley, gurgins, bran, oats, turneps, cabbages, and clover, not any one article of which was the production thereof. And, notwithstanding it is our lots to be so wretchedly situated, in Y.'s opinion, as to be content with forty shillings *per* cow *per annum*, nett profit, and pigs included, in the occupation of a farm *wholly* to a dairy, I cannot find, from any of his calculations or accounts, any method which is likely to exceed it; for his method of feeding hogs is altogether as eligible where there are no cows as where there are ever so many.

I would just say, for the information of Y. that we have not only some horses, but a considerable number of sheep, and some hay, and expect to have a pretty good crop of the latter this year.

I apprehend no occasion to trouble you with the account of managing a dairy, which, in Y.'s opinion, is so pitiful, since, from what is already remarked, that gentleman has done it for me; but may, in some future paper, give an account

count of the method of making the cheese called Double Gloucester, worth now four-pence *per* pound by the hundred, and some other sorts for which this county is famous.

I am, a practical correspondent,

RURICOLA GLOCESTRIS.

L.

W H E A T.

FOREIGN ESSAYS, January 1765. Art. 3.

A treatise on Lodged Corn, with the means of preventing that misfortune; written by M. J. BERTRAND of SWITZERLAND.

A FRIEND of mine, who is a great lover of husbandry, asked me what he should do, and what precautions he should take, to prevent his corn from lodging, or being laid. His land is very rich, and yields great crops; yet is it subject to this misfortune.

I prescribed to him the remedies which I am now about to lay before the reader. The subject is in itself of great importance.

Many farmers who are possessed of prime land, suffer very considerable losses, by the quantity of corn which they have yearly lodged; for the ears that fall scarcely ever ripen or perfect the grain, which is in this case generally small, shrivelled, and starved; the vessels in the stalk being obstructed, the free course of the sap is consequently impeded, if not totally stopped.

In these rich lands, the cause of this misfortune is their being too free of their nourishing or vegetative qualities. Though the stalks of corn are ever so well nourished, yet when they have not a sufficient elasticity, if they have imbibed too much moisture, or that the heat is not great enough

nough to dry them, and continually extract the superfluous watery particles, as soon as the corn spindles, the stalks not having consistence enough to keep themselves erect, bend easily with every high wind, or whenever the large blades are wet with dew or rain.

This is the cause of the disaster: the remedies follow.

I. It is absolutely necessary that the land should be cleared of all superfluous water, at least as much as possible, either by making open ditches or covered drains, deep enough for the plow to go safely over them. If stones are not at hand to put into these drains, small faggots, or any kind of brush-wood may serve, but the faggots will do best, and last longest, if cut in the winter-season.

These are to be laid at the bottom of the trenches, over them straw, and lastly the earth.

If the ground has a natural slope, it must be humoured in making these covered drains, and the water must have an easy fall.

II. These lands are always best plowed high, even in ridges, or in narrow high raised stiches, according as the soil is more or less damp.

III. If the field has a slope, the furrows must not either cross it horizontally, or go up and down, but they must have an easy fall obliquely down, so that the water may run gently off without carrying away the fine earth, or the vegetative particles which are mixed with it.

When land is thus circumstanced, this precaution is absolutely necessary; so that it cannot with any degree of prudence be neglected.

IV. The farmer must not be sparing of his water-furrows, and they must be so disposed as best to answer the purpose for which they are intended.

V. By plowing deep the superfluous moisture is naturally carried downward, and the roots of the plants, instead of being surfeited with it, are only gently moistened, and moderately refreshed.

VI. The deep autumnal plowing, in which the furrows should, if possible, be drawn from east to west, and the summer

mer crows plowing, may also much contribute to prevent this misfortune, by promoting the attenuation or division of the particles of earth.

VII. Such lands as these must in particular never be plowed in rainy weather, or when they are wet, though they should not even be wet enough to rise in clods. It is much better to defer the plowing some time longer, even if the farmer should be obliged to give the two last plowings, one after the other, successively, without any intermediate space of time being allowed.

In these rich lands we shall do well to remember Virgil's precept of plowing and sowing dry; if we do not, our corn will not only be in great danger of lodging, but may probably also be smutted, for rich lands are most subject to the smut.

VIII. When the frosts come on, and the earth is full of water, the wheat is lifted, more or less, out of the ground; this weakens the plant, by exposing some of its roots to the air; indeed they are often totally uncovered.

This may be remedied, by passing a heavy roller over the corn in dry weather in the spring of the year; but then the field should have been deep plowed. Nevertheless, if the corn should stand in need of being weeded, which, however, it never should do, the rolling may be dispensed with; the weeders will earth up the plants sufficiently, by walking over the land, and plucking up the pernicious inmates.

IX. When wheat is too strong and vigorous in the spring of the year, it will infallibly be lodged before harvest. The corn in this case will find moisture in abundance, but too little true vegetative nourishment. Tull recommends, that the plants should, when this happens, be thinned, either by hand, or with a weeding-hook; this answers well, but it is expensive.

I saw a field in the year 1760, where the wheat plants came up much too thick. In the spring a harrow was drawn over one half of it. The weather was cloudy, and the earth rather dry than moist.

Q

At

At harvest-time, the crop of this part was much more considerable, than on that which had not been harrowed. I am apt to think this method is better than mowing wheat in the spring, or feeding it down with sheep.

It is true, in the latter cases, the wheat will not be lodged, but then there will be a great number of barren ears; they make, indeed, a fine appearance whilst growing; but examine them, and you will find numbers of the chests empty, and without any grain in them.

This may be depended on, as I write from experience.

X. I would not bury the seed so deep in moist soils, as I would in those which are drier. This at least is certain, trees planted deep in such soils do not thrive.

XI. All hot manures, such as the calcareous earths, and absorbent substances, ashes, foot, tanner's bark, brick rubbish, burnt clay, lime, rubbish from old buildings, shells, and shell-marle, agree extremely well with such lands as those I have mentioned above.

The manure, however, should be laid on sparingly, be well spread, and equally dispersed all over the land; in moist soils it wastes slowly.

XII. I should be willing to try, whether such land might not be plowed and cropped for several successive years without resting.

If the farmer has plenty of dung, he might very safely sow alternately wheat, rye, or bear, and the several sorts of spring-corn, provided he always plowed up his eddiss immediately after harvest, and the fallows might be sown with cole seed, turneps, or planted with madder, if the farmer did not think it would too much impoverish his land.

XIII. On these rich lands it has been for some years the custom to sow winter-barley, or maslin, for the second crop, instead of spring-corn; and this, I think, for many reasons, good husbandry.

My opinion is, that the square-barley, big, or bear, is a more profitable crop than summer-barley or oats; and tares also yield an excellent fodder. But if the farmers, who
prefer

prefer these crops, should attempt to sow them on one earth, they will do wrong, and suffer accordingly, as this is never done by the good husbandmen, whose example they would wish to follow. Two earths at least must be allowed, the first plowing to be given immediately after harvest. The stubble being buried, serves as a manure, and is ready carried on to the field.

The second plowing is for the seed-earth; and, if the season should be so unfavourable, as to prevent the land from being plowed immediately after harvest, the plowing may be deferred, without any bad consequences, till it is convenient, even till near seed-time, when the two plowings may be given at one and the same time, provided the farmer has the precaution to burn the stubble.

If two earths were not in this case allowed, the soil would be much more impoverished, and would not be by far so replete with vegetative juices; by which means the corn would be weakened, and the stalks would not have that springiness, which is so requisite to them.

XIV. A careful steeping of the seed will also in some sort be a prevention to this misfortune. Good seed, well chosen, changed from time to time, and carefully prepared, produces plants that are more vigorous, stronger, and better conditioned, than when these precautions are omitted; there is nothing more certain than this.

Yet a modern writer (the piece here referred to was published in the transactions of the Bern society), willing, as he says, to reduce agriculture to its first principles, thinks very differently.

Under the head of sowing, he advances several paradoxes contrary to the experience of all farmers in all countries.

In the first place, he pretends, that wheat intended for seed should be cut green, saying, that no flour is wanted from this corn.

Secondly, he asserts, that it is sufficient simply to change the seed, by buying it chance-medley in the market, without making any inquiry about the place of its growth, &c.

Lastly,

Lastly, he says, it is quite unnecessary to give any preparation to the seed, to promote its first shoot.

But who will believe that a germ half formed can give birth to a perfect grain; and that a grain which has not arrived at a state of maturity can supply its germ and radicles with the quantity of nourishment they will, in the infant-growth of the plant, have occasion for?

Who will be persuaded, that a change of seed made in the negligent manner this writer mentions, can be of any great use? neither does he assign any reasons in support of these his extraordinary maxims, which are entirely different from the practice of every prudent farmer; and the gardeners, who are supposed to understand best the refined parts of husbandry, adopt quite contrary maxims.

This writer does not, it is true, absolutely deny the good effects resulting from the preparation of the seed according to some experiments lately made, in hastening the germination, guarding against the depredations of insects, and defending the crop from the smut; but he makes very light of their assertions, who say that the small quantity of ashes and lime used in steep, can any ways conduce to strengthen the plants, or augment their produce.

It cannot be denied, even by this writer, that the lobes and radicle of the seed at its first developement are easily affected, either one way or the other, to their injury or benefit. These parts are at that period so very weak and delicate, that a trifling quantity of salts and absorbents may have a lasting effect on them; and it is universally acknowledged that the future well-being, as well of plants as of animals, in a great measure depends on the first nourishment that is given them, and the first care and attention that is bestowed on them.

But to have done with this seeming digression.

XV. In rich soils the seed should be thinly spread on the land, if the farmer would secure his crop from being lodged.

When corn comes up too close and thick, the crop often abounds more in straw than grain, and the best of soils will yield but a small increase, when the plants stand so close

close as to starve and choke one another ; for they must then be all in a languishing feeble state : but if, on the contrary, the farmer is on such soils sparing of his seed, the wheat will have room to branch and spread, the stalks will be strong and vigorous, and the crop will support itself stiffly against the wind.

Nothing is more easy than to ascertain the quantity of seed which a field will require.

The best way is to make some small experiments, in order to judge how much the quantity usually sown may be safely diminished. Chuse a well prepared piece of ground, sow one part of it thin, and the other thick, and compare the crop of each with the other.

By repeated experiments on various soils, the farmer may soon learn, without risking any great matter, how much seed the several kinds require.

XVI. Early sowing may also contribute to the prevention of this evil.

When the exterior parts of the plant are stopped in their progress by the cold, and their growth checked by the snow and frost, the minute interior parts, the roots, the fibres, and the mouths by which they extract their nourishment, are strengthened and increased in proportion to the degree of vigour and strength which the plant possesses, and enabled by this means to put forth in due season stalks that will not give way to every blast of wind.

XVII. The right of commonage claimed in many parts, contributes in several respects to weaken the straw of wheat. The farmer, fettered by a savage and unjustifiable custom, cannot till his field when he pleases, nor husband it in the manner he thinks best.

He cannot plow in the stubble immediately after harvest, to sow winter-barley ; he is not permitted to sow turneps when his crop is off ; he must not turn up his stubble before the winter, to prepare the land for the reception of the spring-corn ; he must not plow his fallows early in the spring ; and, indeed, it should seem that the more care he takes to get his lands into proper tilth, the more are they
poached,

poached, trampled on, and spoiled by the permission which this barbarous custom gives the commoners of turning cattle on at all times of the year, but when the lands are in crop, even when they are covered with water. It is certainly then ardently to be wished that this evil was totally removed.

XVIII. Sometimes wheat will be lodged on account of its suffering from frost, or snow, in the spring; or from the water which has formed lodgements in the flats.

When frost comes after plants have made their spring-shoot, it breaks their delicate fibres, and obstructs their vessels, particularly if they are in a moist situation. This naturally weakens them, and hurts their future growth.

To prevent this, the furrows of the seed-earth should be, if possible, drawn from north to south, and the land should be so disposed that the water may not any where find a lodgement.

XIX. Wheat is also lodged in certain places on account of its being surrounded by bogs or woods, from whence at all times there arise cold vapours, which every now and then retard, or intirely suspend the course of the sap, and check the vegetation.

The remedies here are draining the bogs, and cutting down the woods, from whence these pestilential vapours are exhaled.

XX. The best land is sometimes subject to have lodged corn, by being exposed to certain strong winds. Such fields should be sheltered by high quick hedges, or by trees planted on the side whence the winds blow.

It cannot escape the notice of the reader, that in these observations I have passed over all poor light lands, as on such the farmer can never expect to have strong wheat.

This evil may however, even on such land, be in part guarded against, by laying the seed three inches deep, by deep plowing, by dressing it only with strong manures, and very rotten dung, by rolling the land with very heavy rollers, immediately after it is sown, and again about the
month

month of April, if the plants seem root-fallen or hoven; and lastly, by sheltering the crop from drying winds.

I am well convinced, that if farmers who are subject to have their wheat lodged, will attend to the rules I have laid down, and put them in execution, they may not only guard against this misfortune, but also against the smut, by which so many fine crops are spoiled.

W H E A T.

MUSEUM RUSTICUM, Aug. 1764. No 2.

Observations on sowing Wheat, making Composts, Covenants in Leases, and artificial Pastures; from an Essex Farmer to the Editors.

GENTLEMEN,

AS I have been many years a farmer, it is not to be wondered at that I should know something of husbandry.

Experience, which is an excellent mistress, has, in fact, bestowed on me most of the knowledge I have acquired: I imagine, therefore, that a letter now and then, containing the result of this experience, will not be unacceptable to you.

I perceive that your work is intended as a channel of communication, to convey the good usages of one part of the kingdom to other parts where they are less known: this is a very laudable scheme: and as I am apt to think we, in this county, are far from being bad farmers, I shall inform your numerous readers of some of our practices.

I have chosen that noblest of crops, wheat, for the subject of this letter; and shall therefore defer other matters to some future opportunity.

Most farmers chuse to sow wheat on a fallow; we, on the contrary, often, not without good reason, avoid it.

Every

Every fallow designed for wheat requires a good dressing of rotten dung, or some other manure ; and this dressing, we imagine, often is the cause of a smutty crop, if laid on uncompounded ; therefore, whenever I sow my wheat on a fallow, instead of laying on my muck-heap unmixed, I make it into a compost in the preceding spring : this compost consists, according to the nature of the soil it is to be laid on, either of chalk, light earth, and rotten dung, or of lime, clay, and dung, laid in a heap, in alternate layers, or beds.

This compost-heap I cause to be frequently turned during the course of the summer, till it is thoroughly mixed, and forms one united mass of manure, rather crumbly than otherways.

With this manure I dress my fallows in the same manner farmers lay on their rotten dung alone ; and I find, by experience, it is less apt to heat and canker the wheat-feed, and it is also much less inclined to mould and burn the feed.

This, I say, is my method of management when I sow my fallows with wheat as a first crop ; but I more generally approve of making wheat the second crop after barley, oats, beans, or peas.

I am sensible many of your readers will be surpris'd at this method, and exclaim that it is impossible to get a good crop of wheat but after a good fallow ; yet I know the contrary : it is from experience I know it ; may I not therefore venture to assert it ?

When I intend to sow wheat as a second crop, I lay my due quantity of compost on the land some time before I sow it with barley, oats, beans, or peas.

When this crop is off, the following year I sow wheat. You may suppose the land to be duly prepared by well-timed and careful ploughings ; but I am to premise, that after beans and peas, being hoeing crops, the land is much sooner brought into good tilth, than after oats or barley.

The

The wheat sowed the second year of the fallow is, with me, generally a good crop, and almost always clear from smut and pepper wheat.

If, by any accident, the wheat should be sickly, or pining, after Christmas, I bestow on it a top-dressing of wood-ashes, foot, if I can get it, or coal-ashes, if the soil happens to be strong: this seldom fails answering my expectations; checking the growth of the weeds, and forwarding that of the corn.

It is very frequently that I sow wheat in this manner for a second crop; but when I have an opportunity of chusing, which I cannot always do, as I must suit my crop to my wants, I prefer, for the first crop, beans or peas, either of which I take to do the land nearly as much good as a fallow.

Neither peas, nor beans, are, in my opinion, great impoverishers; and the frequent hoeing which they both require, if they are properly cultivated during their growth, brings the land into finer order than the best regulated course of husbandry with the common implements could effect.

Wheat succeeds particularly well after either of these two last-mentioned crops; and I have found, by experience, that if peas, or beans, are made intermediate crops, and are well and properly hoed during their growth, land of a moderate quality may, without being impoverished or hurt, be made to bear a continued succession of crops for many years; but it must be understood that it should, from time to time, be refreshed with proper dressings of well-prepared compost.

I know, many farmers think there is no such thing as carrying on a course of husbandry without allowing, once in three or four years, a year of fallow; but such are little acquainted with the benefit resulting from hoeing crops; and it is this benefit that has of late induced farmers to sow such immense quantities of turneps in the counties of Norfolk, Suffolk, Essex, and other counties adjacent.

Many of the advocates for intermediate fallows think

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that

that the earth requires rest; but this is a great mistake; for I could easily make it appear that, in a proper method of husbandry, land might be almost continually cropped, without being impoverished or worn out.

The real benefit accruing from frequent fallows is, that they allow the husbandman time and opportunity to bring, by good tillage, his land into proper order for the reception of the seed; but in the method of husbandry I would recommend, the land would always be kept, by frequent stirring, in such good tilth, that the time betwixt gathering the crops, and sowing the next succeeding seed, would be abundantly sufficient for any preparation it might require; for it is a well-known fact among husbandmen, that when land is well tilled and kept in good order, one ploughing will go much farther than three where the land has been neglected, is rough, and grown hard and cloddy, through inattention or laziness.

The doctrine contained in this letter may to many be new; yet certain I am, that the principles on which it is founded have so many advocates, that it would soon be very extensively adopted were the leases of farms made in a different manner to what they are.

The present form of leases is a great impediment to the progress of agriculture, for there is in almost every lease a covenant from the tenant to the landlord, that he will plough and sow the lands according to the custom of the country in which the farm lies, and allowing due fallow at fixed intermediate times; covenanting besides, that he will not turn up any old lays or pastures, though they might be much more proper for tillage.

By the first covenant herein mentioned, we find the farmer is prevented, by his lease, from substituting hoeing crops in the stead of fallows; so that when he is inclined to sow beans, peas, or other plants of the like nature, he must sow them as pay-rent crops; that is, instead of a crop of wheat, barley, or oats, which would have been sown had they not.

This restriction is replete with many and great disadvantages,

vantages, and the more so, as it prevents many ingenious and sensible farmers from making experiments which might, and certainly would, tend to the improvement of husbandry.

By the second covenant mentioned above, a farmer must never plough up his old lays, though the land may have been laid down in a very unskilful and unhusband-like manner, may be barren towards the surface through the unskilfulness of the last ploughman who turned it up, and may, besides, on account of the nature of its soil, be much fitter for tillage than pasture.

I know it will be objected, that should the farmers have this liberty granted them, all the old lays in the kingdom would soon be turned up; but I cannot imagine they would act with so little caution. I would willingly compound for having a great quantity of old grass-grounds converted to tillage, as I am well satisfied that the artificial pastures would, in many cases, be good substitutes for the natural grasses.

As to oxen, we have them to the full as good, when stalled to turneps, carrots, &c. as if they were fed in the finest fattening grounds: the same may be said of sheep; and it is well known that cows may be made to give a great deal of milk by feeding them on green lucern, saintfoin, clover, tares, cabbages, turnep-tops, and many other sorts of artificial pastures. For our horses, any of the above plants, to which we may add carrots, are equally good, especially with an addition of a mixture of rye-grass.

I am, GENTLEMEN,

Your constant reader,

Essex,

And humble servant,

July 3. 1764.

W. WOOD.

W H E A T.

W H E A T.

MUSEUM RUSTICUM, August 1764. No 1.

Reasons why some of the Wiltshire Farmers sow their Wheat-Seed sometimes so late as November, December, and January; in a Letter from Mr Phillips to the Editors.

GENTLEMEN,

ALMOST every part of this kingdom has a method of farming peculiar to itself; and this I have often found to be true, in the many journeys I have made through various parts of the island.

A short time since, my occasions calling me down into the west, I stopped for a few days in Wiltshire, where I could not help observing, that the wheat-corn was remarkably backward, though it, in general, promised to be a good crop.

I thought it worth my while to ask some of the neighbouring farmers the reason of this appearance, when I was informed that most of the wheat was sown late, owing to a wet autumn, which prevented them from giving their land the necessary ploughing for that crop sooner than November, December, and even January *.

The soil is a pretty good loam, on a chalky bottom: and I found they often sow late; but whenever they do it, they take care to allow an additional quantity of seed, generally one fourth, or a third, more than they use when they sow early.

I was also told, that many benefits often resulted from such late sowing; particularly, the crop is generally clearer from weeds; for in early-sown wheat, poppies, and other noxious weeds, are very apt to get a-head, and greatly in-
jure

* Sowing later than the middle of October, should not be recommended in our climate of Scotland. C.

jure the corn. I even saw in my walks many early-sown fields, which rather seemed to be under poppies than wheat, as the poppies were in full bloom, and made a glaring appearance.

The Wiltshire farmers, the best of them I mean, often give their land four ploughings for wheat; and they find their advantage, as it is by such means brought to a fine tilth, and yields a good crop.

Another advantage they told me they had from sowing their wheat late was, that in the blooming season the weather was generally fine; whereas, in a wet summer, the bloom is often washed off from the forward sown wheat.

But it must not be imagined this method of sowing wheat late is indiscriminately pursued: in many circumstances it would be very imprudent to do it.

This method of husbandry must, to meet with success, be chiefly practised on fallows, where the land is good, and has been well dressed.

Every crop, and method, has dangers to encounter; and the chief danger of late sowing is, that a frost may come on just as the seed begins to sprout; but then good land, well dressed, is not so subject to this misfortune as poor, unmanured land, that has, perhaps, been not half ploughed.

I find, from inquiry, also, that it is dangerous sowing wheat on clover-lays on one ploughing only, unless it is done sooner than the middle of November; for the turf, or grass-lay, forms a crust immediately under the seed-corn; and this not only prevents its taking a firm rooting, but also exposes it to the ravages of field-fowls, which are, at this season, particularly voracious, as having a scarcity of food; and the infant plant is, besides, liable to be killed by the frost, just as it is about sprouting and shooting out its first leaf. It stands, therefore, to reason, and is warranted by experience, that wheat should not be harrowed in on a clover-lay, on one ploughing, so late as after the middle of November, as the danger is great, though the loss may not always be certain.

You may not, perhaps, deem this letter so important as
many

many which every month appear in your collection. I conceived the hints contained in it might be useful to some farmers, or I should not have given myself the trouble of writing it, or you of perusing it: after all, I shall entirely acquiesce in whatever judgment you may pass on it, and, whether you insert it or not, shall not withhold from your work that degree of applause which, I think, it every way merits from the lovers of agriculture and country-improvements.

Determined still to continue your constant reader, as long as you oblige the world with your monthly treasure,

I am, GENTLEMEN,

London,

Your very humble servant,

June 12. 1764.

JOHN PHILIPS.

W H E A T.

MUSEUM RUSTICUM, October 1763. No. 24.

A Letter to the Editors, on an improved Method of breeding Seed-Wheat.

GENTLEMEN,

ALMOST every landholder has some methods of farming his land peculiar to himself: this, Gentlemen, is my case; and as I know of nobody that follows my practice but myself, my intention is, with your assistance, to lay it before the public; that, if it is approved of, it may come into more general practice; but if, on the contrary, no advantage is thought to result from it, I should be glad to see some reasonings on the subject by some of your ingenious correspondents.

My reasonings are but short on any subject: if any thing seems in my mind probable to succeed, I try it, and govern my future operations by the success of that, and a few more experiments in the same affair.

I join with many others in opinion, that it is best every year to change one's seed-wheat *, and this has been my constant practice : I have had many a weary ride to get seed that would please me ; for I am, and always have been, very difficult in this matter.

I have near two hundred acres of land in constant tillage: these I divide into three portions, so that I have every year about sixty acres in wheat, sixty more in barley and oats : and the remainder are either fallow, or in beans, peas, or turneps, &c.

When I first came into my farm, I expended annually, of seed-wheat, thirty quarters; for, after the example of my neighbours, I allowed four † bushels of seed for every acre I sowed.

These thirty quarters often cost me above seventy pounds; and God knows I could sometimes but little spare so much money, after the great annual expence of getting in my harvest.

Some part of my land differs greatly in its nature from the other : near half my farm is a stiff deep clay ; what bottom it has I know not, as I never could find it in digging my

* It is certainly adviseable frequently to change the seed: to do it every year is being perhaps over scrupulous, though it is erring on the right side. To assert that this change of seed is proper, is very easy, because it is warranted by constant experience ; but it is not so easy to assign a reason why it should be necessary : to say the land is tired of bearing repeatedly the same crop, is in fact saying just nothing, unless we suppose that different crops require different juices to nourish them ; but whether they do, or do not, is a point not yet settled among the naturalists. We should, however, incline to think that all plants require and subsist by the same nutritive juice, and that the difference in the properties of plants is caused by the very great difference there is in their organization ; but we are far from imposing our opinion on others, neither would it be proper here to enter more largely into a disquisition on the subject. T.

† This is a bushel more than is sown by most farmers, even in the common way of husbandry. O.

my ditches, &c.; the other half is a bed of light sandy loam with a gravelly hard bottom*.

This difference in the soil of my farm is on many accounts a great advantage: particularly, my wheat does not all ripen at the same time; I have generally nearly got in that growing on my gravelly land, before that on my clay is fit to cut; and I can besides plow in all weathers, frost excepted.

But, Gentlemen, not to digress too much, I took it into my head that, with proper care, I could breed for myself, on my own land, as good seed-wheat as any I could buy, if not better; and I determined within myself to make the experiment.

Before I made this experiment, I had reduced the quantity of seed I used on each acre, to three bushels, which was a great saving to me. I had still occasion for above twenty quarters.

My first step was to select ten acres of the best land I had; five from the heavy, and as many from the light part of my farm: this land was by nature rich and good; it lay on the gentle southern declivity of a hill, and required very little manure; it lay in two little detached fields, at some distance one from the other.

When I had prepared this land by a winter and summer fallowing, in which time the clayey part was plowed seven † times, and the light land five times, I had both fields
sown

* Every farmer should, by digging or boring, inform himself what are the different beds of earth under that which he constantly tills. A.

† It cannot be too often inculcated, that it is scarcely possible to plow lands too much; the only danger is in the expence that is incurred: yet it must be considered, that though land cannot have too much tillage, this tillage may be given at improper seasons, so as to do more hurt than good; as, for example, clayey lands should never, if there is any possibility of avoiding it, be plowed in wet weather, particularly after Christmas; for if it should rise in clods in autumn, the winter frosts
will

sown with some of the best wheat I could procure; that for the heavy land I got from Hertfordshire, the other from a particular friend who holds a farm in Cambridgeshire.

When the season for sowing approached, I was mightily pleased with the appearance of my two little plots; for they resembled the best-kept gardens, not a weed to be seen, and the earth as fine as garden-mould.

On this occasion I did not brine my seed, but had it put into a large tub: some water was then poured on it, and I made a stout labourer, with a stiff half-worn birchen-broom, stir it very briskly about for near half an hour; this I imagined would wash off the smut, if any there happened to be: the light seeds, which were very few, were skimmed off.

I let the wheat afterwards lie three hours soaking, when my man again stirred it briskly with the same broom, and immediately poured the water off.

Whilst yet wet, the seed was sprinkled in the usual manner with flaked lime, in order to prepare it for sowing.

My reason for not brining it * was, that I thought it

S

would

will mellow and reduce it; but if it is plowed wet in the spring, it will be rough the whole summer. It should be remembered that the intention of tillage is to reduce the earth into very small particles; every thing therefore that conduces to this desirable end must of course be highly useful. N.

* It is not always necessary to brine wheat before sowing: washing it well answers the purpose of preserving it from smut, by removing the infectious powder which is apt to lodge at the rough germ of the seed. Brining is most necessary at a late sowing, as it will then bring the corn forward; but it is always best omitted, unless the land is in fine tilth: if it has not been well plowed, the wheat, which had made a quick progress by the assistance of the saline particles it had imbibed in the brining, receives a fatal check, not finding the circumjacent earth in a condition to second the operations of the salt. When any good is expected from brining wheat, the seed should be left from twelve to twenty-four hours in the steep, according to its quality, as it is harder or softer. If this is not done, the brine will be of little more service than plain water. N.

would bring it too forward ; and I rather chose to sow it early, which is, I know, in general, a very good practice.

In sowing this land, I, in some measure, followed Mr Tull's directions ; that is, I sowed my wheat in rows with large intervals in the following manner.

I had a furrow opened about a rod from the hedge : in this furrow some seed was by a careful hand very thinly scattered, not sowed in the common way with a sling of the arm.

It took up time ; so I had two sowers to each plow. When the plowman had drawn the first furrow, he then opened another, at about ten feet distance from the first in the land ; and seed was in the same manner thinly scattered in this also : after this, he returned to the first furrow, and drawing another close to it covered the seed ; the same thing he did by the second furrow : he afterwards went two bouts without any seed being sown in the furrows ; but the third bout, seed was thinly scattered, as before, to form the second row of corn in each bed : another bout was made to cover the seed when the two beds were finished, the middle of the interval being left unplowed.

In this manner * both my little fields were sown, in
double

* Our correspondent's method was but a faint imitation of that recommended by Mr Tull ; yet, all things considered, it was perhaps better calculated for success. The instruments made use of were such as the labourers well knew how to handle : they were not much put out of their way ; consequently they were more ready in their obedience. Had the drill-plow been used, there would doubtless in the light land have been a greater regularity ; but it is a question, whether in the heavy land it would have worked at all. The advantages to be derived from the full and entire practice of the new husbandry are not yet known ; neither perhaps would it be proper to fall into it too suddenly. We would recommend to our readers, at least such of them as practise husbandry, to allow their plants of corn much more space to grow in, and not be afraid of the additional expence of hoeing and weeding,
which

double rows with intervals about five or six feet wide betwixt the beds, and the rows about two feet asunder.

The corn came up very well, and preserved a good wholesome appearance all the winter.

Early in the spring, that is, in the month of February, I made a careful man sow the spaces betwixt the rows of corn on the heavy land with wood-ashes, and on the light land with foot * : these were both soon washed in by the rain, and the effects were speedily to be seen in the new-assumed vigour of the crops, and this vigour continued till the corn was ripe.

As soon as any weeds appeared, the intervals which were left unplowed at seed-time were turned up, and the spaces betwixt the rows diligently hand-hoed : this hand-hoeing was several times repeated, to keep the crop quite clear from weeds : the intervals had also several other stirrings ; but this work was chiefly done with a very light plow without an earth-board in the heavy land, and without either earth-board or coulter in the other little field.

Every thing came very well forward ; and when the wheat began to spindle, I had the outsides of the rows well earthed-

which will be well paid for at harvest. If this method succeeds with them, of which there cannot be the least doubt, as it has been several times tried, they may then attempt sowing in rows with intervals, but still making use of the common implements. There may not probably be occasion for their making any farther alteration in their practice : yet they may incline to try the drill ; if this is the case, let it be on light land, and on a small plot ; if it succeeds, they may enlarge their plan ; if it fails, the loss will not be great, and the result of their experiments will be of use to others, if they have public spirit enough to communicate their observations. N.

* Both wood-ashes and foot sown in spring on corn land are excellent manure : about twenty bushels of either is enough for an acre ; even half that quantity will be of very material service. N.

earthed-up with a plow, and the insides with a hand-hoe: the insides were done first *.

At harvest the fields made a noble appearance, a fine well broke earth stripped with rows of healthy wheat.

The cutting this wheat was very easily performed, it stood so ready to the reapers hands; and when it was housed and threshed, it yielded me about four quarters on an acre, one with another, the first year, though I have since had sometimes more, sometimes a little less.

My ten acres then yield me about forty quarters; and I had occasion for only about twenty-two to sow my common wheat-lands: I therefore took only the first and prime part of this crop, getting the sheaves very lightly threshed; what remained made excellent bread-corn.

I never saw finer seed-wheat than mine was this year: my heavy lands I sowed with the seed produced by the light field, and my light lands with that produced by the heavy field.

As soon as I had got in this select crop, I got the intervals in order for sowing with a second crop, in most respects continuing the practice of the year before: I had the like success, and might, perhaps, with equal advantage, have continued cropping the fields every year in the same manner: but, not to depend too much on Mr Tull, my next crop was a full crop of barley on them, which succeeded well; and I selected two other plots of ground, of equal goodness, for my seed-corn husbandry, as I call it †.

In

* The practice of earthing-up plants, just before they seed, is much to be commended: it furnishes the roots with a fresh supply of food, and gives an astonishing vigour to the plants. In wheat it fills the ear, and plumps the grain, in some measure supplying a deficiency of rain before harvest: it also often prevents the corn from being lodged. This is scarcely practicable but in the new way of husbandry. O.

† Our correspondent was quite right not to hazard sowing the third crop of wheat on the same land, particularly as he says he had other fields as proper for his purpose: we do not dispute,

In this manner I have now for several years past managed, growing my own seed; and, if any thing, my crops have since increased: but I have again reduced the quantity from three to two bushels of seed, for each acre of my wheat-land in common: that is, such as I sow in the ordinary way: on some of my rich, strong land, I don't use above six pecks *, and find it answer very well.

I could like to extend this new husbandry, or this imitation at least of the new husbandry, over all my lands that are in tillage: but in my method of practising, the expence would be too great: my sowers are well paid; I have enough to do to make my plowmen go out of their ordinary way; and it costs me a great deal hoeing: yet all this I do not grudge to procure good seed.

By introducing the drill-plow and the horse-hoe, I could save a great deal of labour on my light lands; and I may probably some time or other attempt it: but, at the same time, I am very sensible, I shall find great difficulty in getting men that will even try to do the work with these instruments. The common labourers in husbandry hate novelty;

dispute, but that the same land may, in the new way of husbandry, if properly assisted by manures, bear wheat for many successive years; yet is there no necessity for making this a practice, especially as there is always such a great demand for barley and oats; and any soil that is proper for wheat, will produce barley and oats to advantage, and may afterwards without hazard be put in wheat again. The trying land in this manner is rather more a matter of curiosity than any thing else. Mr Tull asserts, that in his method, without the assistance of any manure, land may be profitably sown with wheat every year: but this is not our opinion, whatever may be done in this case, with manure properly and seasonably applied. N.

* That quantity, and even less of good sound tried seed, is enough, with care, for an acre of any kind of land: more is rather pernicious than otherwise, besides the loss of seed, no inconsiderable article in many farms, as our correspondent plainly by experience proves. R.

velty ; they pursue, without murmuring, the old beaten track ; but put them out of it, and thought will become necessary : the fact is, they imagine it a very great hardship to be obliged to work and think too, and all for the same money.

Without great resolution, and some kind of authority, a farmer will be obliged to let them even dig a ditch their own way : innovation they like not in any shape, often making use of the expression, that they are too old to learn.

This, to a man who is very much disposed to lend a helping hand towards the improvement of agriculture, is a mortifying circumstance : there is scarcely any thing so difficult as to make an obstinate man useful : if, by dint of authority, you oblige him to go out of his way, he will rather contribute to the loss of your crop, than not endeavour to convince you that he is in the right. I have often, to my my sorrow, felt the truth of this observation *.

Several reasons, though I deal not much in them, may be assigned for the seed-wheat, I raise in the above-described manner, being so good.

In the first place, I sow it on land that has not tasted any dung † for some years, but is, in its own nature, rich and good : to this practice I ascribe a great deal of its goodness.

* Our correspondent's reasonings on this head are very just : he seems to speak feelingly ; and we are sorry to say that many others lie under the difficulties he mentions. What chiefly prevents a reformation among our labourers in husbandry, is the masters in general being but little more enlightened R.

† Plants that grow on sweet undunged land are much to be preferred to such as are raised on the rich-manured soils, such as we find near great towns. For this reason, pulse and garden-stuff, growing in a little hamlet, is always sweeter than where dung is plentiful. About Paris the gardeners are often obliged to lay down their grounds in grass to abate their rankness ; for in a certain number of years the land, by being continually mended, grows so rich that nothing of garden-stuff will thrive on it, but sickens with a surfeit of unprepared food, rots at the root, and dies. O.

ness. In the next place, as the corn does not stand too thick, it enjoys all the benefit it can receive from the sun and air : by this means it attains a perfect maturity, and is certainly improved both in bulk and quality.

The slight spring-dressing I give it, of soot or ashes, is of very great service : it warms the roots and brings the corn forward ; it loosens the earth, and either itself gives nourishment to the plants *, or, at least, puts the earth in a disposition to afford it.

Not a little is to be attributed to the frequent hoeing betwixt the rows and stirrings of the intervals ; and I find one very particular and great advantage result from it, which is, that it is an excellent means of clearing my land of weeds ; for they no sooner attain a part of their growth, but they are destroyed long before they seed.

Farmers in general think their fields cannot in the spring be too full of wheat-plants : the ground seems covered with verdure, and the blades are, as it were, crowded for want of room : when the weeds begin to get up, they send in a parcel of men and women with weeding-hooks, not letting a hoe come near the land to cut them up : they are sadly afraid they should not have plants enough at harvest ; whereas, if they were to measure and mark off a rod-square of land in February, and count the plants growing on it then, and afterwards count them in the beginning of August, it would always be found, that four parts in five of them had perished in the intermediate months, and that what remained were, by far, too much crowded still, and had each but few stalks.

I never weed my corn of late years ; for as I allow only two bushels of seed, and often less, to an acre, the plants come up thin ; and there is of course room for a moderate-sized

* This dressing probably does both ; for the salts contained in the soot and ashes, being dissolved by the moisture of the earth, not only become a proper food for the plants, but raise a fermentation, and dispose the earth in its turn to yield its salts or nutritive juices. H.

sized hoe, which is the instrument I clean my land with * : and so far from being fearful of having my crop injured by this means, I order the workmen, where the plants stand too close, to cut them up without mercy, as they would do the most pernicious weeds : if there happens by any accident to be a vacant spot, they easily remove some plants to it, with earth about their roots, by the help of their hoe.

By this management, I, in some measure, reap the benefit of the advantages promised by the new husbandry ; though I have not such opportunities of so often giving the plants a fresh supply of nourishment, nor of earthing them up when the grain is forming in the ear ; for, after the corn has put forth its stalks to any considerable length, it would not be so proper to send in the hoers : but all the loss is the want of earthing-up the plants so late as I could wish ; for the weeds will, before this time, be pretty well got under, and few of them will be able to ripen their seeds before harvest, when they will of course be destroyed by turning in the stubble, which I always do as soon as possible ; though many of my neighbours let their stubbles lie rough all the winter, for the sake of feeding a few score of ewes.

In the beginning of my letter I observed, that almost every farmer has methods peculiar to himself ; and they are, for the most part, such as were practised by their fathers, grandfathers, &c. whom they succeeded in the culture of their farms.

My methods, as you must now be sensible, differ from most of those used by other occupiers of land ; and if I cannot so well defend them by arguments, an experience of several years has convinced me that I ought still to per-
sist

* We cannot enough recommend our correspondent's practice with regard to keeping his crops clean : the hoe is certainly the most proper instrument ; and, as he observes, there is no danger if many of the wheat-plants are cut up in the work : the great fault of the present race of farmers, is scattering their seed too thick on half-tilled land. T.

list in the practice of them : they have answered all the ends I could wish from them ; what could I desire more ?

I am enabled to raise all my own seed without the trouble of procuring it from a great distance, at a large expence, and with a deal of trouble.

My crops are to the full as good as ever they were, and I use less seed by above one half : my manure goes a great deal farther than it used to do, because I bestow more plowing and other tillage on my land ; and I am not so much pestered as I formerly was with weeds, for they now very seldom are suffered to feed on my land.

Of this last evil, I mean that of weeds, I have not, however, yet got quite rid ; for such of my fields as border on my neighbours lands are still often infested : some of these same neighbours, I have several times mentioned, are but slovenly farmers, and the weeds which have winged or downy seeds, are constantly wafted by the wind from their land to mine * ; so that I, in some measure, am punished for their neglects : thistles are this way particularly troublesome, as the seeds of them will sometimes be carried a very considerable way by the wind.

I have very little more to say at this time, except that I never thresh the sheaves that are to supply me with seed-corn, till just when I want to make use of it. I have a notion, that the seed keeps better in the covering nature has given it, I mean the chaff, than it would do without it ; and I am pretty certain it sprouts sooner in the ground, the husk or bran of the grain being preserved in a tenderer and

T

more

* This evil and inconvenience, complained of by our correspondent, is of much greater consequence than is in general imagined : we have often seen instances of great disappointments by this means, particularly when the lands, in the neighbourhood of a clean farm, are infested with thistles, the seeds of which, as he justly observes, are carried a considerable way by a brisk gale of wind. It is a great pity farmers in general are such slovens in the land ; their hedge-rows often have the appearance of a nursery of weeds ; and it is sometimes difficult to determine whether poppies or wheat-plants are the crop. O.

more yielding state, than it would be were it exposed to the open air *.

I should be glad if any of your correspondents would inform me, at what distance wheat-plants should stand from each other in a good soil, so as that their roots should have space sufficient to extend, that their stalks should enjoy all possible benefit from the air and sun, and that yet the land should bear the largest crop it was capable of.

I have not yet been able to come to any tolerable certainty in this important point in husbandry: I have thought much about it, but as yet to no great purpose. Was this point once fixed, we farmers should go upon a much greater certainty, both with respect to the quantity of the seed, and the reasonable expectation we might form of the crop.

I wish you, gentlemen, great success in your laudable undertaking: and, indeed, I doubt not but you will meet with it, and have plenty of correspondents and subscribers.

GENTLEMEN,

Your most obedient humble servant,

, Oct. 4. 1763.

AN ESSEX FARMER.

W H E A T.

* This is, perhaps, being more nice than is necessary: if it is, however, an error, it is on the right side; and we could wish every farmer was as accurate in his practice and observations. E.

W H E A T.

MUSEUM RUSTICUM, Dec. 1764. No 85.

*A Method of preventing a Wheat-Crop on lightish Land,
from being Winter-proud.*

GENTLEMEN,

MOST farmers are fond of new wheat: yet ask them why they are so, and they can assign no reason; it is enough for them, that their ancestors have been the same.

I, who love now and then to make my observations on causes, as well as their effects, have found by experience that it is sometimes most advantageous to sow old wheat.

I have a field of twenty acres, which, whenever, for a long space of time, it came in course to be sown with wheat, was always sure to make it winter proud.

The soil, being rather light, was not perhaps the best adapted to the growth of wheat; yet was it convenient to me to sow it in its turn with wheat, for many reasons, particularly as it lay near my house.

I endeavoured therefore to find some remedy for this distemper, as I thought it, in the soil: I tried several sorts of manure, and even lessened the quantity, but without its answering my expectations; at last accident pointed out to me a remedy I had long sought in vain.

Towards the latter end of wheat seed-time, about ten years ago, my ploughmen were putting a finishing stroke to sowing; but suddenly one of them came to me, with a report that they had not seed enough: I was for some time at a loss what to do, as my seed wheat was expended; and the weather being fine required dispatch. At length, however, I recollected I had in the house a sack of old wheat, intended for family-use: I ordered them to take it, and they sowed it accordingly.

In

In about three months after, on viewing the field, I found that the old wheat was backwarder than the new; and this inspired me, the next wheat-feed time, to try old wheat on my twenty acre-field above mentioned, imagining the crop would not then be winter-proud. I succeeded as well as I could wish, and have ever since continued this practice on all my land that is so inclined. I must however observe, that I sow old wheat rather earlier than I do new.

I am, GENTLEMEN,

Middlesex,
Oct. 17. 1764.

Your humble servant,

E. N.

W H E A T.

MUSEUM RUSTICUM, Dec. 1764. No. 87.

Of the Benefit of Lime, used as a Top-dressing for Wheat.

GENTLEMEN,

I Have, for some years last past, held a considerable farm in this county of Leicester, and have, thank God, met with some success in my practice.

My methods of farming are thought by many to have something peculiar in them; yet, as I do not often miscarry, no one has a right to find fault with me.

Great part of my farm is very good wheat-land, the soil being a substantial loam.

I frequently, as well as the rest of my neighbours, make use of lime as a manure; but then I use it differently from what they do.

The common practice is, to lay about forty bushels of unslaked lime on an acre, which makes a peck on every square-perch, (half a bushel when it is slaked.) On wheat-land they spread the lime at the same time they sow the seed; but this is a way I do not much approve, and for
this

this reason I vary my practice. The method I use is as follows : I sow my wheat without laying on any manure ; but in the beginning of the month of February I get, for every acre of land I intend to lime, twenty bushels of that manure, unslaked, and forty bushels of sand, or the rubbish of a brick-kiln.

Towards the latter-end of the month I cause the lime to be slaked, which doubles its measure, and very well mixed with the sand ; immediately after which, in the last week of the month, I have it scattered by way of top-dressing over the green wheat ; and as rain generally succeeds, it is soon washed down to the roots of the plants, and gives them a vigour and strength of growth, that is really astonishing to a person who had never seen this method practised.

This is my way, if I see the weather is inclinable to be wet ; but if it is dry, and not likely to rain, I double the quantity of sand, in order to take away all danger of the wheat plants being burnt, or hurt, by the strongly corrosive power of the lime.

The above method I would willingly recommend to the attention of your readers ; and though I have benefited greatly by it, yet need they not take my word, as it is so very easy to make a small trial, and form a judgment from the success they may have.

I must observe, that I look upon it to be almost a matter of indifference what kind of sand I use, except that I prefer lime-stone sand to the crystal sand, as being most absorbent, and in truth prefer the rubbish of broken bricks to either.

It will perhaps be unnecessary to tell your readers my motive for this preference ; yet that I may not be thought obscure, I shall do it.

When lime is slaked, it crumbles and falls into very minute particles : the smallest of these particles are, together with the moisture that adheres to them, absorbed by the large open pores of the brick rubbish, which afterwards dispenses them by slow degrees to the soil on which it is laid,

laid, for the support of the crop : this occasions the operation of the lime to be more equal ; the parts which were not absorbed are first attracted by the earth ; these nourish the young plants, which, in time growing stronger, have power to draw from the absorbent the particles it had reserved for their use.

This may be called refining on agriculture ; but I know it has its use.

I am, GENTLEMEN, &c.

Your humble servant,

Leicester,
Oct. 26. 1764.

L. O.

W H E A T.

MUSEUM RUSTICUM, June 1764. No 86.

To the Editors of the MUSEUM RUSTICUM.

GENTLEMEN,

I Have seen, in one of your monthly papers, a copper-plate of the price of wheat and malt at Windsor market for one hundred years : to this plate I have added three columns, one containing the quantity of wheat exported, the next the gross duty on malt, and the third contains the compositions made each year ; so that over-against the date you find each of those articles for that year. This may be, at least, a matter of curiosity, and, perhaps, of use to your readers : as such I send it, that you may, if you think proper, publish it. The sums are certainly true.

I am, GENTLEMEN,

Your humble servant,

June 15. 1764.

Y. Z.

N. B. There is no occasion for beginning higher than 1696, because the accounts go not higher.

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At

*An Account of the true Price of Wheat and Malt at Windsor,
in the fourth Column is the Quantity of Wheat exported th
In the fifth and sixth Columns are the gross Duty arising*

Years.	Wheat per Qr.			Malt per Qr.			Wheat ex Qr.
	L.	S.	D.	L.	S.	D.	
1696	3	11	0	1	8	0	
1697	3	0	0	1	8	0	
1698	3	8	4	1	12	0	
1699	3	4	0	1	19	4	5
1700	2	0	0	1	11	4	49,1
1701	1	17	8	1	4	0	97,4
1702	1	9	6	1	8	0	89,8
1703	1	16	0	1	3	4	105,9
1704	2	6	6	1	8	0	90,3
1705	1	10	0	1	6	0	96,18
1706	1	6	0	1	2	0	183,3
1707	1	8	6	1	3	4	173,3
1708	2	1	6	1	8	0	83,4
1709	3	18	6	1	13	4	69,3
1710	3	18	0	1	16	0	14,4
1711	2	14	0	1	15	4	76,8
1712	2	6	4	1	10	8	135,1

Windsor, over-against each Year marked in the first Column; and reported the same Year, taken from the Accounts at the Custom house. duty arising from the Malt, and the Compositions, the same Year.

Wheat exported.		Gross Duty on Malt.			Compositions.		
Qr.	Bush.	L.	S.	D.	L.	S.	D.
		20,495	16	$0\frac{1}{2}$			
		425,239	6	$0\frac{3}{4}$	1556	13	9
537	2	370,926	15	2	2702	3	$3\frac{1}{4}$
49,136	1						
97,492	7	173,449	18	$4\frac{1}{2}$			
89,872	2	140,305	13	$1\frac{1}{4}$	151	13	$6\frac{3}{4}$
105,955	0	689,492	6	$0\frac{3}{4}$	2084	18	$10\frac{1}{4}$
90,315	3	509,699	1	$1\frac{1}{4}$	3036	3	$2\frac{3}{4}$
96,185	1	699,392	19	$6\frac{1}{2}$	3564	11	$6\frac{1}{4}$
188,325	3	595,690	16	$1\frac{1}{2}$	3786	7	6
173,355	1	644,770	18	$11\frac{3}{4}$	4075	16	3
83,447	5	598,432	0	$6\frac{1}{2}$	4301	2	6
69,374	2	522,828	3	$10\frac{3}{4}$	4497	16	0
14,448	0	507,274	4	$3\frac{3}{4}$	4680	6	3
76,899	0	574,119	2	10	4720	16	3
135,191	0	575,417	14	5	4751	2	3

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Years.	Wheat per Qr.			Malt per Qr.			Wheat exp Qr.
	L.	S.	D.	L.	S.	D.	
1713	2	11	0	1	7	0	176,24
1714	2	10	4	1	9	4	175,07
1715	2	3	0	1	10	8	165,49
1716	2	8	0	1	8	0	74,64
1717	2	5	8	1	5	4	22,74
1718	1	18	10	1	4	8	71,80
1719	1	15	0	1	6	8	127,76
1720	1	17	0	1	11	4	81,88
1721	1	17	6	1	8	4	81,63
1722	1	16	0	1	2	8	178,88
1723	1	14	8	1	3	8	157,71
1724	1	17	0	1	10	0	245,86
1725	2	8	6	1	8	0	204,41
1726	2	6	0	1	8	0	142,18
1727	2	2	0	1	8	0	30,31
1728	2	14	6	1	12	0	3,81
1729	2	6	10	1	14	8	18,99
1730	1	16	6	1	7	0	93,97
1731	1	12	10	1	0	5	130,02
1732	1	6	8	1	5	8	202,05
1733	1	8	4	1	2	8	427,19

Years.	Wheat per Qr.			Malt per Qr.			Wheat exp Qr.
	L.	S.	D.	L.	S.	D.	
1734	1	18	10	1	2	8	498,196
1735	2	3	0	1	2	8	153,343
1736	2	0	4	1	4	0	118,170
1737	1	18	0	1	6	8	461,602
1738	1	15	6	1	8	0	580,596
1739	1	18	6	1	6	0	279,542
1740	2	10	8	1	12	0	54,390
1741	2	6	8	1	12	8	45,416
1742	1	14	0	1	10	8	293,259
1743	1	4	10	1	8	8	371,431
1744	1	4	10	1	4	8	231,984
1745	1	7	6	1	3	4	324,839

N. B. In this computation you are to know, that in every year there are two prices of corn, the one at Lady-Day, the other at Michaelmas; both which are put together, and the half is taken for the common price of that year, as before noted; but for the year 1740, the price is put down as it was at Lady-Day only.

1746	1	19	0	1	2	4	130,646
1747	1	14	10	1	2	8	266,906
1748	1	17	0	1	3	4	544,387
Total				— — —			8,436,962

Wheat exported.		Gross Duty on Malt.			Compositions.		
Qr.	Bush.	L.	S.	D.	L.	S.	D.
176,247	1	645,195	3	$11\frac{1}{4}$	4671	12	6
175,074	0	516,267	12	$2\frac{1}{4}$	4503	15	0
165,490	2	631,097	0	11	4233	17	6
74,642	0	687,061	8	$0\frac{1}{4}$	4224	0	$3\frac{1}{2}$
22,741	1	744,236	13	$5\frac{1}{2}$	4347	6	0
71,800	0	692,718	8	$9\frac{1}{4}$	4447	12	6
127,762	1	727,956	16	$5\frac{1}{4}$	4578	11	3
81,882	2	660,836	10	$5\frac{1}{2}$	4690	11	3
81,632	6	737,208	11	$8\frac{3}{4}$	4692	8	9
178,880	3	850,992	8	$7\frac{3}{4}$	4868	10	0
157,719	6	790,540	14	$4\frac{1}{4}$	4811	13	9
245,864	6	624,780	9	$8\frac{1}{4}$	4722	2	6
204,413	3	703,111	7	$3\frac{3}{4}$	4356	5	0
142,183	3	696,642	14	10	4291	4	3
30,315	3	655,330	12	$9\frac{3}{4}$	4301	2	6
3,817	0	540,202	15	$2\frac{1}{2}$	4254	17	6
18,993	3	593,693	17	$3\frac{3}{4}$	4153	7	6
93,970	7	732,228	11	3	4372	13	9
130,025	2	665,957	14	$3\frac{3}{4}$	4212	10	0
202,058	4	693,369	18	$10\frac{1}{2}$	4011	7	6
427,199	0	768,101	15	3	4037	7	6

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Wheat exported.		Gross Duty on Malt.			Compositions.		
Qr.	Bush.	L.	S.	D.	L.	S.	D.
498,196	4	698,381	4	$11\frac{1}{4}$	3903	1	3
153,343	5	657,446	14	$5\frac{3}{4}$	3813	2	9
118,170	7	610,168	2	$2\frac{1}{2}$	3750	18	9
461,602	0	631,431	6	$10\frac{1}{4}$	3847	2	6
580,596	4	674,096	14	$5\frac{1}{4}$	3769	15	0
279,542	4	688,916	17	$0\frac{1}{2}$	3870	5	0
54,390	4	569,129	7	6	3910	0	0
45,416	7	519,393	10	$4\frac{1}{4}$	3788	15	0
293,259	6	665,128	13	$9\frac{1}{4}$	3682	12	6
371,431	3	678,134	1	8	3606	6	3
231,984	5	819,368	8	8	3575	3	9
324,839	5	642,557	0	$11\frac{1}{4}$	3441	12	6
130,646	2	617,756	16	$6\frac{3}{4}$	3290	7	6
266,906	7	641,747	16	$4\frac{3}{4}$	3255	7	6
544,387	5	681,359	15	$2\frac{1}{2}$	3292	15	0
436,962	4						

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			Wheat, Qr.	Bush,
Exported the last fifteen years	—	—	4,353,715	4
Ditto the preceding thirty-five years	—	—	4,083,247	0
Total exported in fifty years	—	—	8,436,962	4
The export of the last fifteen years exceeds the thirty-five preceding years	—	—	270,468	4
At an Average, each year of the last fifteen years there must be exported	—	—	290,247	5
At an Average annually for the thirty-five years	—	—	116,664	1
The increase of export annually, at an ave- rage, for the last fifteen years	—	—	173,583	4

The Export of each Ten Years.

The first ten years	—	—	—	974,622	1
The second ten Years	—	—	—	981,906	6
The third ten years	—	—	—	1,254,471	1
The fourth ten years	—	—	—	2,684,156	4
The fifth ten years	—	—	—	2,541,806	0
Total	—	—	—	8,436,962	4

Years.	Wheat per Qr. L. S. D.	Malt per Qr. L. S. D.	Wheat Qr.
1749	1 17 0	1 5 4	629,0
1750	1 12 6	1 5 4	947,0
1751	1 18 6	1 6 0	661,4
1752	2 1 10	1 7 4	429,5
1753	2 4 8	1 7 4	299,6
1754	1 14 8	1 8 0	356,0
1755	1 13 10	1 5 4	237,0
1756	2 5 2	1 6 0	101,9

The first ten years amount	—	—
The second ten years	—	—
The third ten years	—	—
The fourth ten years	—	—
The fifth nine years, and one to be added,	—	—
Total	—	—

N. B. The export of wheat comes to, *com. an*
42,184. l. 6 s. *per annum*, if the bounty is allowed, which

Bush.
 715 4
 247 0
962 4
 468 4
 ,247 5
 ,664 1
 ,583 4
 4,622 1
 1,906 6
 4,471 1
 4,156 4
 1,806 0
9,962 4

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Wheat exported,		Gross Duty on Malt:			Compositions:		
Qr.	Bush.	L.	S.	D.	L.	S.	D.
619,049	0	643,779	17	5 $\frac{3}{4}$	3166	5	0
947,602	1	755,177	4	4	3219	13	9
661,416	4	696,084	5	5 $\frac{3}{4}$	3234	6	3
429,279	4	626,131	11	1 $\frac{1}{4}$	3183	2	6
299,608	7	650,907	9	10 $\frac{3}{4}$	3523	6	3
356,270	1						
237,459	2						
101,936	4						
—	—	4,422,160	9	0 $\frac{1}{4}$	23,702	16	8 $\frac{3}{4}$
—	—	6,096,215	12	9 $\frac{1}{4}$	45,078	4	6 $\frac{1}{2}$
—	—	6,987,603	1	5 $\frac{1}{2}$	45,567	6	9
—	—	6,724,755	19	11	39,881	6	6
added,	—	5,842,132	12	10 $\frac{3}{4}$	32,440	10	6
—	—	30,072,867	16	0 $\frac{3}{4}$	186,670	4	6 $\frac{1}{2}$

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corn. ann. 168,739 qr. 2 bush. or 1,144,914 bush. that is,
 , which is 5 s. per quarter.

N U M-

N U M B E R

An Account of the Quantity of Corn exported from England distinguished

	Barley. Qr
From Michaelmas 1696 to Michaelmas 1697	32,855
From Michaelmas 1697 to Michaelmas 1698	30,984
From Michaelmas 1698 to Christmas 1698	5
From Christmas 1698 to Christmas 1699	75
From Christmas 1699 to Christmas 1700	25,896
1701	21,953
1702	16,280
1703	71,523
1704	30,729
N. B. The quantity of wheat exported 1705	21,386
each of these years may be seen by 1706	10,221
referring to the last article. 1707	4,771
1708	29,937
1709	40,512
1710	5,744
1711	8,412
1712	19,838

	Barley. Qr.
From Christmas 1712, to Christmas 1713	52,542
1714	18,579
1715	5,080
1716	14,857
1717	18,435
1718	71,139
1719	9,649
1720	4,505
1721	11,608
1722	37,528
1723	45,789
1724	10,298
1725	13,782
1726	20,017
1727	8,688
1728	198
1729	4,650
1730	14,982
1731	13,562
1732	13,874
1733	37,598
1734	70,224
1735	57,520

B E R LXXXVII.

from England from Michaelmas 1696, to Christmas 1756,
linguished each Year.

Barley.		Malt.		Oatmeal.		Rye.	
Qr.	Bush.	Qr.	Bush.	Qr.	Bush.	Qr.	Bush.
32,855	0	51,811	5	295	3	2,596	4
30,984	6	44,526	6	151	7	1,275	2
5	0	2,059	0	20	5	68	0
75	0	1,511	3	301	6	405	0
25,896	5	37,571	4	391	1	27,231	0
21,953	2	50,447	1	285	5	43,917	0
16,280	1	71,856	6	89	4	51,710	2
71,523	7	123,291	2	159	2	58,438	4
30,729	4	102,873	7	219	7	29,284	7
21,386	6	137,396	2	100	4	24,059	4
10,221	3	141,084	4	62	2	49,892	2
4,771	3	111,153	1	103	7	34,032	0
29,937	6	97,789	3	67	6	4,720	3
40,512	6	139,934	4	37	5	166,512	5
5,744	5	79,530	0	125	1	12,215	6
8,412	6	139,975	7	321	4	37,957	4
19,838	5	191,624	5	303	5	17,735	3

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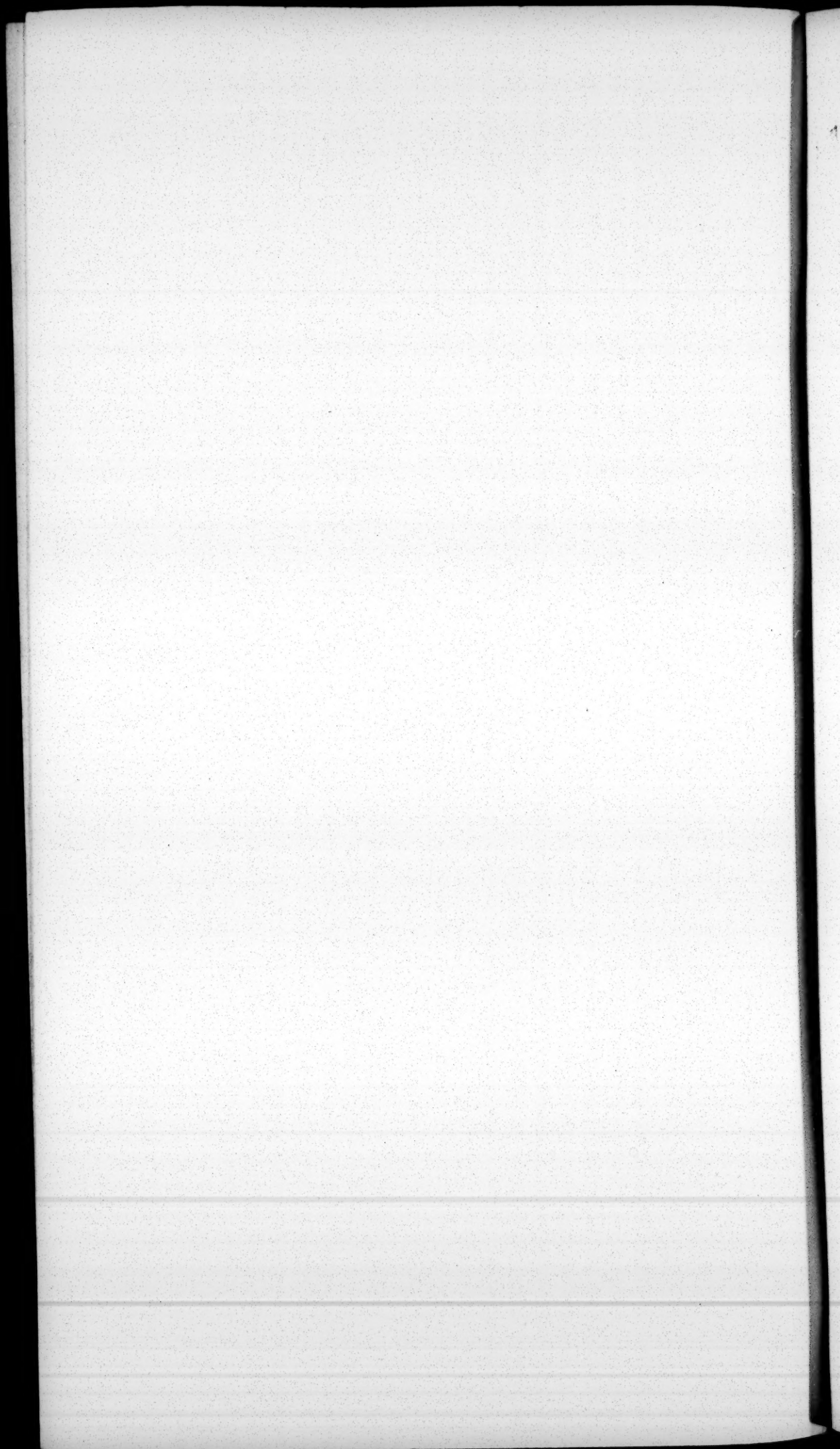
Barley.		Malt.		Oatmeal.		Rye.	
Qr.	Bush.	Qr.	Bush.	Qr.	Bush.	Qr.	Bush.
52,542	0	217,975	7	1,376	3	38 6 5	7
18,579	5	220,274	7	129	0	20,455	0
5,080	1	103,365	1	303	5	31,161	2
14,857	0	226,617	0	719	6	40,123	1
18,435	7	251,083	1	401	1	2,031	6
71,139	7	303,133	3	868	5	49,416	6
9,649	3	357,199	1	219	3	45,502	2
4,505	6	253,509	6	3,471	4	49,41	3
1,608	3	338,942	6	577	7	69,697	5
7,528	7	366,728	2	324	4	42,579	0
5,789	6	305,063	5	541	5	12,737	6
0,298	5	241,895	0	516	4	23,441	4
3,782	6	294,025	2	1,447	4	20,539	5
0,017	1	335,925	5	1,412	6	18,835	2
8,688	4	241,428	4	2,204	7	9,169	3
198	2	195,340	6	1,383	2	13	5
4,650	4	130,743	7	2,541	0	1,460	3
4,982	3	179,446	2	4,479	2	12,394	4
3,562	2	177,699	4	1,808	1	21,089	7
3,874	6	161,075	4	1,274	7	15,535	5
7,598	0	203,115	0	1,487	4	28,155	1
0,224	5	233,124	0	3,038	6	10,735	0
7,520	3	219,781	7	1,920	6	1,329	4

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	Barley.
	Qr.
From Christmas 1735, to Christmas 1736	6,860
1737	23,669
1738	70,689
1739	54,447
1740	24,036
1741	6,614
1742	11,482
1743	34,995
1744	20,090
1745	95,878
1746	158,719
1747	103,140
1748	73,857
1749	52,621
1750	224,500
1751	32,698
1752	106,331
1753	67,049
1754	47,776
1755	32,836
1756	26,938

Barley.		Malt.		Oatmeal.		Rye.	
Qr.	Bufh.	Qr.	Bufh.	Qr.	Bufh.	Qr.	Bufh.
6,860	1	192,602	4	1,196	5	1,220	5
23,669	5	103,718	2	1,921	4	7,849	3
70,689	6	188,607	7	1,777	3	36,159	1
54,447	1	191,876	6	1,116	3	29,791	2
24,036	6	145,527	5	2,571	7	8,979	4
6,614	1	123,357	6	1,106	6	7,622	1
11,482	4	189,525	7	1,380	2	63,272	2
34,995	1	219,217	5	1,882	3	88,272	7
20,090	0	219,862	4	1,657	6	74,169	1
95,878	7	219,354	6	9,770	3	83,966	2
58,719	3	282,024	6	20,203	0	45,782	3
03,140	2	361,289	3	2,122	4	92,718	3
73,857	0	349,363	0	3,768	4	103,891	4
52,621	3	355,469	5	1,281	2	106,312	4
24,500	7	330,754	2	4,283	4	99,049	3
32,698	0	256,547	4	2,476	2	71,048	4
06,331	3	287,578	6	1,590	1	57,847	2
67,049	0	274,424	7	7,012	1	24,835	7
47,776	3	321,995	0	2,330	2	42,915	1
32,836	0	341,568	6	1,112	2	43,441	7
26,938	5	236,925	6	2,310	4	29,968	7

R Y E.



R Y E.

MUSEUM RUSTICUM, March 1765. No L.

Reflections on the Culture of Rye; with some useful Hints for such Farmers as may chuse to sow it in the Spring.

GENTLEMEN,

IN consequence of the request of your correspondent Mr Mitchell, that "some of your correspondents would say a word or two about rye, which, tho' not equal to wheat, is a very good grain," and the confirmation of that request by yourselves, I sit down to throw together some reflections on this subject, which I may suppose myself to understand tolerably, as great quantities of this grain are every year grown in this neighbourhood; and I have known one thousand stooks, yielding each above a bushel, brought to my father's barn and stacks in one year off this estate.

Mr Mitchell's request plainly expresses his expectation to be rather of occasional reflections on the culture of this very useful grain, than a set discourse thereon; and I shall accordingly only note such things relative thereto as seem to want illustration, confirmation, or refutation, in writers on this subject.

I. Mr Mills begins his account of rye by saying, that it "is generally sown on poor, dry, gravelly, or sandy lands." (See page 370. of his First Volume). But there is a kind of soil, which comes not properly under the description of any of the above, on which much excellent rye is grown in this and many other parts of the kingdom, viz. a limestone-soil. The stones which are cast up here by the plough, are much too large to come under the name of gravel. They keep open the soil, and render it fit to imbibe all the genial influences of the heavens, and the juices of those manures which are mixed with it.

II. Mr

II. Mr Mills, in the next place, tells us, that "it would not be right to sow this grain on land which will bear wheat, because the value of rye is greatly inferior" (See *ibid.*) It would have been more satisfactory if Mr Mills had assigned either some good reason why the value of rye is greatly inferior to that of wheat, or at least some good authority: but unfortunately neither reason nor authority can be alledged in support of this assertion; on the contrary, Mr Mills himself has alledged an authority, above exception, elsewhere on the other side of the question.

One of your correspondents, who styles himself once a farmer, sensibly observes, "It is evident we must not always judge of our profits by the sum we receive, for it is also sometimes necessary to take a retrospective view of our expences."

We must, in the next place, consider it as a notorious fact, that when rye is well managed, it is a greater crop than wheat with equal management: and, in the third place, it is equally notorious, that the straw of rye is much more valuable, both for thatching, bedding, and fodder, than the straw of wheat, though Mr Mills, and some of his correspondents, are so much mistaken as to think otherwise. Again, let us reflect, that the price of the seed is less than that of wheat.

Let us add, that rye is an hardier crop, suffers less from the frosts, &c. of winter, is forwarder in spring, &c. bears a bad harvest better, and is therefore a less precarious crop.

Lastly, let us consider, that it sells generally for three fourths of the price of wheat, or more; so that, the other circumstances considered, there is no reason to say, that rye is a crop greatly inferior in value, in nett profit, to wheat. But, to assign our authority, the Marquis of Turbilly, as cited by Mr Mills himself, has asserted, from exact accounts kept by him, that he has found rye as beneficial a crop as wheat; though he thought wheat-straw better for horses, the contrary of which is well known.

III. As it appears above, that Mr Mills's reason why it is

is not right to sow rye where wheat will grow, is not the right one, it may be expected that I should either deny the position universally, or assign a true one. I will do the latter. It is frequently not right to sow rye where wheat will grow, because the nature of the soil is often such, that a bad crop of rye will grow where a good one of wheat might be raised, *viz.* in very stiff soils. Rye requires a dry, light soil; and though wheat may do very well on such, if rich and deep enough, yet rye, on the contrary, cannot thrive on a stiff clayey soil.

IV. Mr Mills relates, on the authority of his justly favourite Dr Elliot, a fact which must, at first, surprise, *viz.* "If rye be sown successively every year upon the same land, both the crop and land will be greatly improved; inso- much that some grounds, which would yield but five bushels to the acre at first, have in time afforded a crop of fifteen bushels to the acre, without the charge of dung or any manure." (See p. 372. of his first Volume). The authority of Dr Elliot for integrity and judgment is such, that a fact vouched on his experience is likely to have many followers, especially where the practice flatters the idleness and avarice of husbandmen.

Now this is likely to be the case in the present instance; and Mr Mills should have taken peculiar care, as he chose to record the fact, to warn the husbandman against the evil consequences of it; which he has not done, though it might have been more particularly expected from him, who has begun the third section of his first Volume, by saying, "Experience soon taught men, that even the most fruitful soil cannot constantly yield the same grain." (See page 346). Now, as this fact of Dr Elliot's recording follows at no great distance, it might be considered as an abatement, or correction of, if not contradiction to, the general preceding assertion, and therefore should have been sufficiently guarded by proper cautions. What Mr Mills has not done, I think myself obliged to do, for the reasons assigned, to the best of my power.

The case then which Dr Elliot records, seems to me to

be of a peculiar nature, and which should by no means be extended to a general practice. He speaks of ground newly broke up, and not sufficiently mellowed by the plough. These two circumstances account for all the surprising ones.

The wretched crop of five bushels is to be accounted for by the want of tillage; and the improvement of the crop and soil are to be accounted for by the pulverising the land more and more for subsequent crops, the natural freshness of the ground then giving its full return. But if the ground thus brought into tilth had been still longer sowed with rye every year, it would soon have appeared in this, as in every other case, that the crops would have decreased, unless the principles of the new husbandry prevent such decrease.

V. Mr Mills informs his readers, that the usual allowance of seed-rye is about two bushels to the acre, and the crop is about twenty bushels. (See page 371. of his first Volume). Now, it is very usual, in this and many other parts of Yorkshire, to have above thirty stooks of fine clean rye, which will yield each above a bushel, on one acre.

VI. Mr Mills says, with truth enough, that "a little sprinkling of dung, or mud, though it be but half the quantity commonly used for other corn-land, will, if laid on rye-ground, greatly advance the crop. (P. 371). But no good husbandman with us contents himself with this management. We depend much on our rye-crops, which are very valuable.

We plough our ground with as great care, and as often, for rye as for wheat; and we manure it as well in proportion to the strength of the soil. Good rye has brought four shillings and four and six-pence by the bushel, in this country, these two years, while wheat sold for five or six shillings.

Our grounds give such good crops of rye, with due management, that I have known many farmers content therewith, when rye sold for two shillings the bushel, What must they be, when it sells for four shillings and four
and

and sixpence the bushel, with the same management, and their crops not much thinned?

VII. I have observed elsewhere, that the practice of feeding down wheat with sheep is problematical, and only to be determined by a diligent consideration of all circumstances. Your sensible correspondent, "Once a Farmer," writes in the same strain. Mr Mills asserts, that "in Leicestershire, where they absurdly winter-feed their wheat by consent, they never feed their rye, because it is too tender to bear it." (Page 373. of his First Volume.) But this gentleman seems here, as in several other places, too positive.

Experience shews that in this country farmers frequently winter-feed their rye, without any disadvantage; nay, probably with advantage, if the blades are very luxuriant, and the land rich enough to bring on the new shoots after the sheep are taken out, and the sheep be taken out early.

The apprehension of Mr Mills, that the sheep's feet will make a multitude of holes, which will retain the water and hurt the rye, is without any good foundation; for, though it is true that rye cannot bear much wet, it is equally true, that the proper soil for rye being airy and high, the small quantity of water which is retained in the sheep's footings cannot do it any harm. New treadings fill up the former, and fix the soil at the roots of the corn, and the sheep's dung and urine enrich the soil.

If any has a doubt that this representation is not just, let him go on to a rye-field of proper soil and situation, from which sheep have been drove in a fair morning in spring, when a wind rises. If the soil is at all moist, he will see innumerable footings; but let him return in the evening, and he will be amazed to see how much one fair and dry day has altered the appearance. The mellow earth once dried will fall; and any rain, not excessive, which follows, will rather do good than harm to the plants.

I plead for this practice, under proper restrictions, as a convert on the best conviction; for during all the time that my father kept the main part of this estate in his own hands,
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he never suffered any sheep to feed on his rye ; but the success of our neighbours, who have fed sheep on like soils with great success, under proper restrictions, convinces me that we were great losers by not giving into their practice, especially as the eating of the first shoots of rye makes ewes milk extraordinarily.

VIII. Rye is very excellent for giving a good skin to horses, as it is loosening, and carries off foul humours, which hard exercise and bad provender may have left in them. It is also a most excellent feed for geese. I cannot say the same with respect to hogs, for which animal it seems to me to be too loosening ; insomuch that I have given a great deal of it to them when put up to feed, both dry and boiled, without perceiving any advance in their flesh.

IX. Rye is very generally liked for bread by the people of countries in which it grows commonly, and who are therefore much used to it ; insomuch, that many of them scruple not to prefer it to wheat, the bread of which presently grows dry. There are, however, numbers of persons, who, though used to it from their youth, can never relish it. Some object to the sourness of it when made with leaven, and others to the natural sweetness of the grain, which is disagreeable, especially with the favouriness of flesh meat : and, indeed, I am myself of this number.

X. I agree entirely with Mr Miller, that it must be very bad husbandry to sow wheat and rye together, as the latter will ripen much earlier than the former, and several obvious inconveniences ensue. They who like messlin (of which number I am not) may mix them to their mind when carried to the mill, without any inconvenience.

XI. So many incidents may hinder the sowing of rye in autumn, (because, as Mr Mills well observes, [page 370. of his First Volume] the ground should, by all means be dry when it is sown, and heavy rains after it is sown may rot it in the ground before it come up), that the sowing of spring-rye becomes an object well deserving attention : and all the directions and cautions which can be given about it should be nicely attended to. Yet Mr

Mills

Mills seems so deficient on this head, that having (in page 406.) begun to treat of the culture of spring-corn, with the article of wheat, he passes thence directly (in p. 408.) to treat of spelt, and never says one word of the culture of spring-rye, but passes on to oats.

I shall endeavour, by some short observations, to supply, in part, this deficiency.

XII. I will begin with what Mr Mills has mentioned incidentally on this subject, on treating of wheat and rye in general, *viz.* "when sown upon light land it (rye) ripens much earlier than on cold stiff ground; and by continuing to sow it in such a soil during two or three years, it will be forewarded so much as to ripen a month earlier than that which has been long raised upon strong cold land. For this reason, those who are obliged to sow rye toward spring, generally provide themselves with this early seed." (Page 371. of his First Volume.) This practice certainly should be followed.

XIII. Mr Mills has observed, (page 406.), that wheat may be sown with good success even a little later than the middle of March. Now, as wheat has a stronger body than rye, and requires more time to perfect it, and ripens later, we may conclude, very reasonably, that rye may, with success, be sown even later than this time, especially if a very early sort be provided.

XIV. As dryness is essential to the success of rye, it seems advisable to delay the sowing of spring-rye, as long as can be, with any prospect of success, rather than not have both the ground dry for sowing, and the succeeding weather for some time after sowing likely to be fair; especially as rye soon rots in the ground, if wet.

XV. The ground designed to be sown with rye in spring, should be laid in winter with high ridges, and have good drains to carry off the water, that it may be as dry as possible when sown.

XVI. Hot manures should be used, and particularly lime, which will bring on a speedy shooting. It was long a prevailing opinion, that lime was not a proper manure for the
soil

soil in which the lime-stone was found ; but experience has shewn the vanity of this notion.

XVII. Rolling may be more necessary to settle the earth about the roots of plants of rye sown in spring than in autumn ; for the winter-frosts will have broke down the clods on to the roots of the autumn-sown rye, though indeed the rains may have partly washed that earth away.

XVIII. A moderate sowing of foot, after the plants are come up and rolled, may be of great advantage.

Thus, gentlemen, have I (to the utmost of my power) complied with Mr Mitchel's request and your's ; and from what has been already wrote on this subject, it may appear, that if the society for encouragement of arts, &c. had given a longer time for composing accounts of the best method of cultivating rye, they would have been much more likely to receive satisfactory ones.

I am, GENTLEMEN,

East-Newton,

Your faithful correspondent,

October 19. 1764.

THO. GOMBER, jun

B E A R.

MUSEUM RUSTICUM, Aug. 1764, No. XVII.

On the culture of Bear in Ireland.

GENTLEMEN,

I have often often wondered, since I came to this kingdom, that bear is not cultivated in England, at least more extensively, since I am persuaded it might save that more delicate grain, barley, for beer.

Your readers will find bear mentioned in Ray, The complete body of husbandry, Miller, and Lisle, as cultivated in the North, by some called the *barley-big*, or *square-barley*.

In this kingdom it is cultivated for malt ; but whether it has merit in the composition of beer I cannot say, as I
never

never drink any, (save when I can get the pale Wiltshire drink), all that I ever saw here being of a wretched deep muddy colour, owing, I believe, to the maltsters, who, from the law of the country, are obliged to sell their malt by weight; by which they are tempted not to suffer a sufficient fermentation to be excited, to separate or decompose the pulp of the grain, but put it too soon upon the kiln after wetting, and there dry it very high, as they call it, by which it answers their purpose in the scale: whereas the estimable excellence of malt is to be light; and therefore I hope the selling malt in England by weight will never take place, though I think it would be a national advantage were all the grains, in an unmanufactured state, sold by weight throughout the kingdom, as they are here, and as flour is in England.

Bear is a very strong luxuriant plant, both in grain and straw, resembling barley in growth, but cone-wheat in robustness. It is generally sown here any time between Michaelmas and Christmas, in their best and richest soils, at the rate of one barrel to an Irish acre, which is two hundred weight; and it is no uncommon thing, I am told, to reap twenty, or twenty-five barrels an acre. Two bushels and a half of seed to an English acre will be in the same proportion; I think, a great deal too much; however, that is the practice. I shall sow some this year in different quantities in the drill-way, beginning only with fourteen pounds, and increase till I come to seventy to an Irish acre*; the latter of which, I am persuaded, will be sufficient.

It is generally sown on the best land in every farm, and usually after potatoes, the ground for which has been well dunged; but some of the lands in this kingdom will produce that, or any other crop, without manure: where aid is necessary,

* Five Irish acres make eight English and fifteen perches. Seventy thousand five hundred and sixty feet make an Irish acre, and forty-three thousand five hundred and sixty feet an English acre.

necessary, fallows often precede the crop without manure; others fallow, and manure with a very happy provision they have in the thinly-inhabited and interior parts of the kingdom, called lime-stone gravel, of which, upon the first view of it, it is surprising to hear of the effects; but, upon an essay, that admiration ceases, when we find it to be a very strong alkali, which, from the attraction all alkalies have with acids, soon shews the effects of the acid in the air upon it, as that very soon neutralizes it by an effervescence, which is always the consequence of a conjunction between an acid and an alkali: this effervescence must also act mechanically in separating and pulverizing the soil. Thus, by this manure, they not only procure large crops of bear, and other grain, but also greatly improve land, which, before this addition, shall have been miserably poor.

Some of our English writers recommend the sowing bear on strong clays, and other stiff lands; but from the observations I have made here, I am persuaded it will succeed extremely well on any land which may be fit to produce a crop of barley, though it will succeed on cold stiff-land where barley will not.

Bear is always ripe with us sooner than any other grain, from one to three weeks; and as barley is, so is this, an immediate ready-money article, we being here in the same situation of distilling a very destructive raw spirit in great quantities, called *Whisky*, as I remember we were in England some years ago in distilling and vending Geneva. What is remarkable, they cannot distil here from wheat as in England.

I shall not trouble you, or your readers, any farther on this subject, more than to say, that if you, or the society of which you are members, chuse to have any bear to make experiments with in the approaching season, I shall have pleasure in sending you a bag, as by your means I should hope to hear of so useful and really valuable a grain being introduced in the more southern parts of England. I am situated near Dublin, and can conveniently forward it

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to Chester or Bristol, from whence you may receive it by the waggon.

I had almost forgot to give my reasons why I think it might be useful in England, as I have intimated in the preceding part of this letter. First, and capitally, I think it may, when generally cultivated, be introduced in your malt-distillery, to not only a saving of barley, which I am willing to believe is fitter for beer than bear; but, what is more serious, to a saving of wheat, which is still used by those gentlemen, the malt distillers, in large quantities, which I had an opportunity of discovering when I was last in England.

If the price of malt should be lowered by the introduction of bear, I presume the ruddy-faced ale-drinkers of England, who love to have a good tap of their own, would not be displeased.

Again, in many parts of England, to my knowledge, the farmers begin to feed their hogs with barley-meal, and when pretty fat, they give each hog a bag of peas to "harden his flesh," as they call it, and which really completes the fattening a hog most perfectly. Bear may be introduced for this purpose, to a saving of barley: though I have not yet experienced it, yet, from the nature of the grain, I have no doubt of its answering. Besides these promising advantages, I believe more bear may be raised upon an acre than there can of barley.

With respect to your request, that I would transmit you an account of my methods of adapting the horse-hoeing husbandry to the several crops I cultivate: I am sorry to say, that since the writings of the ingenious Tull, Du Hamel, De Chateaufieux, &c. cannot influence my countrymen to a practice founded on the most rational principles, and the strictest œconomy of nature; I therefore fear any thing coming from so obscure a peasant as I am, will make but little way in a country which I have ever found, in the article of husbandry, superior, in imagination, to all others, as well as to individuals: however, I shall just say, that the successful pursuit of the horse-hoeing husbandry

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depends

depends upon the obtaining good instruments, and obedient workmen ; both which I have acquired, tho', I must confess, with some difficulty : the rest any man of common attention, so far as relates to the operative part, may acquire from books ; but the effects and operations of bodies upon each other, so far as concerns manures, and the qualities of soils, are to be obtained only by some share of chemical knowledge, and is a part which I wish to see laid open to the aid of the farmer.

In the course of your undertaking, I perhaps may now and then request the favour of a few pages for the event of some of my experiments, which are now pretty numerous, and will be more so. Every field of mine in profit is an experiment, and I keep an accurate account of the expence attending each, and every other article ; and, upon the whole, am satisfied it is the cheapest husbandry, and most profitable.

I am sorry I have not leisure to aid in your intended dictionary, which I really think will be a most useful work ; but you have my good wishes for its successful completion, with an addition of a few words.

I am, GENTLEMEN,

A devotee to the public good,

And your humble servant,

Ireland,

AN ENGLISHMAN.

August 15. 1764.

O A T S.

MUSEUM RUSTICUM, Sept. 1764. No. 35.

A Letter from Mr Lamb, on the best Method of cultivating Black Oats, and recommending more frequent Ploughings than are usually afforded them.

GENTLEMEN,

HAVING been for many years a practical farmer in the eastern part of the county of Essex, you will not, I hope, think me impertinent in troubling you on the culture

culture of black oats, which I have very often to great advantage sown.

Most of my neighbours prefer the white Poland oat, which may, I own, in some circumstances of soil and situation, be best. I prefer the black oats because they are hardiest, for which reason they suit best with my convenience; for, as a considerable tract of the farm I occupy is light land, I am under a sort of necessity of sowing this soil early, or, if a dry summer followed, I should have no return at harvest.

Few people allow more than one ploughing for a crop of oats; but such as follow this practice are very wrong-headed; for they may assure themselves, that no crop pays better for ploughing than oats; and it is on this account that I generally give my land designed for oats three tilths; whence I am morally certain arises the largeness of my crops, for I have seldom under five, oftener six, and very frequently seven quarters from an acre, throughout a field.

Your readers will not be surprised at my having such good crops, when I observe, that I almost every year sow some oats on a fallow that has been well dunged; and this I aver to be good husbandry, as it abates the rankness of the soil, kills many of the weeds, and prepares the land in an excellent manner for a succeeding crop of sweet wheat; but I must observe, that I always clear my land of the stiff oat-stubble before I attempt to plough for the wheat.

I have already said that I sow black oats early on my light land: by early, I mean as early as the first week in February, by which time I have generally an opportunity of getting the land in proper order, for a light soil is soon wet, soon dry.

Let me mention once more to your readers, that it is on a light soil, which is apt to burn a crop, that I sow my black oats so early as the beginning of February; for should any of them attempt to sow them so early in a moist, cold, stiff soil, and a hard frost should follow, the young blade would, in all probability, be killed.

I must also remark, that when I sow oats thus early, it
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is generally under furrow; yet I sometimes sow them broad-cast, and plough them in.

The quantity of seed I, for the most part, use, is about three bushels, which I find to be enough; nay, I have sometimes from only two bushels had a good crop; but then I have been particularly careful and attentive to the goodness of the seed, without which precaution I should not, unless the season had been very favourable indeed, have succeeded.

I have found it a very good way to sow first half my quantity of seed under furrow, and afterwards, sowing the remainder broad-cast, harrow it in; and this is often my practice when I sow the latter end of February, or the beginning of March.

When I sow oats after wheat, which however is not very frequently, I turn up the stubble as soon as I conveniently can after harvest, and leave it rough through the winter. The first fine weather after Christmas, I lay it down smooth with the harrows, and immediately give it a cross ploughing.

As soon as February comes in, if it is not a hard frost, I make the land as fine as I possibly can by the harrows, raising a fine loose mould to the surface, which is to be the bed for the oats to lie in; for I sow my oats directly under furrow; after which I pass a moderate sized roller over the field, and then give it a slight scratch with a pair of light harrows.

This husbandry generally produces me a crop I have no reason to complain of.

My chief reason for troubling you with this letter is, to endeavour to persuade my brother-farmers that they do not, in general, allow their oats a sufficient number of ploughings, one being the stated quantity.

If they would plough twice for this crop, they would receive more than twenty shillings an acre for their trouble; but if they would consult their own interests, and allow three ploughings, it would often make fifty pounds difference

ence to them in a field of twenty acres: this they will, perhaps, think wonderful; but it is no less true.

The black oats require particularly to be sown early, especially if the farmer wishes to have them of a fine glossy ebon colour, and that the crop should corn well; for if they are sown late, and wet weather follows soon after sowing, they will be apt to run all to straw; and if dry weather, and the soil is gravelly, it is a chance but they are burnt up.

I have found by experience, that black oats will yield a very large crop after turneps; and this I believe is simply owing to their being sown in a fine tilth; for the mould cannot but be reduced to very small particles if a crop of turneps has been well husbanded, especially if it is in a light soil.

I am, GENTLEMEN,

Your constant reader,

East of Chelmsford, Essex,
Aug. 27. 1764.

J. LANE.

H O R S E - B E A N S.

MUSEUM RUSTICUM, Nov. 1763. No. 41.

A Letter to the Editors, on the sowing Horse-beans in the dry, gravelly, or chalky Loams in the Chiltern Country of Bedfordshire.

GENTLEMEN,

HAVING an hour or two on my hands, as I hate idleness, I cannot, perhaps, better employ my time, than by writing you, for the use of the public, a letter on the important subject of agriculture.

I purpose at present treating only on one matter; that is, the methods followed in the chiltern parts of this county,
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in sowing horse-beans, or tick-beans, as we sometimes call them.

It is very well known, that this plant loves a stiff clayey soil, rather inclining to be moist * ; whereas the soils of the lands I talk of, are either a dry, gravelly, or chalky loam. This obliges us to vary much from the practices of the Essex and Middlesex farmers, who occupy heavy land : were we to pursue their methods, our crops of beans, in a dry summer, would be intirely parched up and lost.

In stiff soils, that are retentive of moisture, a little rain may do ; but if we do not provide against a want of rain, our lands are over-run with weeds, and our crops ruined.

In order to secure ourselves tolerable crops, we sow our beans very thick, either in a broad-cast, and plow them in, or under furrow : we allow always five bushels † to an acre.

By sowing the land so thick the plants come up very close ; and though the earth was at seed-time loose and dry, yet the stalks grow up so near each other as to shade the land, preserve the moisture in it, and keep down the weeds ‡. There is seldom occasion to hoe this crop, the weeds being mostly starved by the bean-plants ; and, indeed, the expence is in general grudged, though it is certain, it would greatly increase the produce of the land.

The great difference betwixt this method of husbandry, and that practised by the farmers who sow horse-beans on
stiff

* Mr Miller observes, that it also loves an open exposure.

† The usual quantity in heavy land is about three bushels. N.

‡ This method greatly differs from the principles of the new husbandry, in which every plant is allowed a certain space to spread its roots, and due culture is given it during its growth ; were the farmers in the chiltern countries to adopt this method, it would, perhaps, be advantageous to them ; for the frequent culture, either with the horse or hand hoe, would settle the light earth to the roots, bring the plants forward, prepare the land well for a future crop, and dispose the earth to receive all possible benefit from the dews, &c. in a dry season. O.

stiff heavy lands, consists in the quantity of seed we allow, that our plants may stand the closer ; for many farmers in my neighbourhood think, that diverse advantages are derived from this method. In the first place, as I mentioned already, it shades the land in a dry summer, and prevents the roots of the beans being parched ; in the next place, it chokes and kills the weeds ; and finally, they think it mellows the land, and prepares it excellently well for a crop of wheat.

Experience convinces them they are, in many respects, right ; for they have often very large crops : I have myself met with great success in this method of husbandry, but do not now practise it, for reasons I shall mention.

The soil of my farm is, for the most part, a light gravelly loam ; and it was on this account, I followed the example of my neighbours in my bean-husbandry : but, going a few years ago into Essex about some particular business, I observed, and have since practised, a much better method, which, however, I have since discovered, was far from being unknown in this county, or in Hertfordshire. The method I mean, is planting beans with a dibble by hand, seed by seed.

This is now my method of practice ; and I find it answer very well, and that it is not so expensive as one would at first imagine.

This work may be done either by women or boys : and when they are a little used to it, they do their work with great expedition. I plant my beans in rows a foot asunder, at three inches distance in the rows, allowing them no more distance on account of the nature of the soil of my land.

My chief reason for preferring this method is, that I thereby save three bushels of seed in sowing every acre ; for I before used five bushels ; whereas, in this method, on my light land, two * are quite sufficient : and this is, indeed, an object

* On a stiff soil, in this method, one bushel of seed is quite sufficient ; and next to sowing with the drill-plow, and using the horse-hoe, this practice is to be recommended. R.

object well worth attention, as horse-beans are sometimes, particularly at seed-time, at a very high price.

In the next place, by this regular method of planting them with a dibble, I have an opportunity of hoeing betwixt the rows : this keeps down the weeds ; and what is of much greater consequence, it loosens the earth about the roots of the plants, disposes it to be benefited by the dews and light rains, and gives a large portion of additional nourishment to the crop. These then are my reasons for preferring this last method.

But to proceed : When my field of beans is planted, I give the land a hearty stirring with a loaded long-tined heavy harrow : this breaks the clods whenever there are any on the land, pulls up the few weeds that have appeared, and settles the earth close to the seeds, so that they vegetate the sooner.

When this is done, I pass the roller, not a very heavy one, over it, to lay it smooth and level ; and I then harrow it once more with a very light harrow to loosen the surface a little.

When the plants are about two inches out of the ground, the land is well hoed with a hand-hoe ; and just before harvest, when the fruit is set, the field gets another good hoeing : if the season is wet and following, I bestow on my crop an intermediate, but slighter hoeing, just before the beans blossom, to keep down the weeds, which would otherwise sometimes get a-head.

Some of my neighbours think my practice a very troublesome husbandry ; but I find it answer very well, and in consequence recommend it all I can to such as will listen to reason founded on repeated experience.

I find another great advantage from this method of cultivating horse-beans, which I have not yet mentioned ; and that is, that the land is so well prepared by it for a succeeding crop of wheat, that I have often sown it on a single plowing with great success ; and the land has been in better tilth than I have often had it after a whole year's fallow.

I cannot, indeed, enough commend the practice which many very intelligent farmers have of late fallen into, of frequently sowing crops that require hoeing, as this, in fact, answers the purpose of resting the land; for the nourishment these plants require in their growth in nothing hurts the land, when compared to the benefit it receives from the frequent stirrings it has during the same period *.

With regard to the hoeing of my beans, I never suffer my work to be slighted over: I employ strong labourers, furnish them with good tools, and my hoeing does the land at least as much good as a middling plowing; for the men cut deep, and stir the land to purpose. This I find the cheapest way of going to work; for I have frequently made the experiment, and ordered them on purpose to skim over a part of a field in the ordinary way, that I might see the difference: and great difference indeed there always was, much more than a person, who was not a judge of the matter, or who had not seen it, would imagine.

I find it necessary, after my beans are cut, to set up the bundles for some time to dry: but this I never do in the field where they grew, as it would sometimes be a means of preventing me from getting the land early enough in proper order for sowing wheat; therefore, as soon as my bean-crop is cut and tied up, I carry them on to some upland dry pastures, where they are set up to dry, and I immediately plow up the field where the beans grew, and give it at least another plowing before I put my wheat into the ground.

I have not a great deal of time to spare, or you should frequently hear from me; but having appointed a gentleman to meet me about some business, at the inn where I now

Z

write

* Our correspondent seems to have adopted, in a great measure, the principles of the new husbandry; we could wish he would try what success he would have in using the drill-plow and horse-hoe: he seems intelligent, and could not therefore be at a loss in making a proper use of them; very little instruction would set their advantages in a very clear light to him. E.

write, at five o'clock this afternoon, and coming here at three, the reading of your proposal, which I happened to have in my pocket, put it into my head to write this letter: if it should be acceptable, it will give me pleasure; if not, it has at least answered the purpose of filling up a vacant hour of my time. I am, GENTLEMEN,

Your most humble servant,

Woodburne, July 31. 1763.

T—N—

H O R S E - B E A N S.

MUSEUM RUSTICUM Dec. 1763, No. LXII.

A letter to the Editors, on the Culture of Horse-beans in the Island of Thanet, and the Use of the Shim, or Kentish Horse-hoe.

GENTLEMEN,

I believe I have already informed you that the farmers in this island are an intelligent, sensible, set of men; they are not slaves to old customs, but are always willing to improve their methods of husbandry, by adopting such new practices as are in other places warranted, by experience, to be good.

To this may we, with great justice, ascribe the delightful appearance the face of the country in this neighbourhood wears: the beauty of nature, in itself so charming, is greatly set off by the ornaments of agriculture: a pleasing varied scene entertains the eye, whilst the understanding is employed in meditating on the great advantages that result from honest industry.

It is not a great number of years since the farmers in these parts have known the use of horse-beans in husbandry; they are now, however, fully sensible of the many advantages that result from the culture of them, well knowing that
nothing

nothing prepares land better for wheat; the tillage they require whilst growing, being of great service towards killing the weeds, and separating the particles of earth, so as to reduce them to a fine mould.

I must do this justice to the farmers of Thanet to say, that their method of cultivating beans is the most perfect of any I have ever seen. Was Mr Tull living, he would undoubtedly be delighted to see them following, almost literally, his instructions: the spirit of them, at least, they have entirely adopted; and this you will confess, when I describe to you their usages.

The land they intend for horse-beans they generally plow as soon as the wheat-season is over, perhaps about the beginning of December. At this time some of the occupiers of the richer lands lay on their dung, in order to fit them for a wheat-tilth; others do not lay on their dung till the beans are off, in which case they generally make a maxhill * on some corner of the land: under this, if they can procure it, they lay some rich mould, and they always contrive to turn it once, if not twice, in the summer, that the dung may be perfectly and regularly rotted †: by this management it is at hand to lay on the land immediately after harvest.

After the land has got the plowing above mentioned in the beginning of December, they let it lie quiet till about the middle of March, when they give it another plowing; after which they furrow the land, as they call it; that is, they draw furrows over the whole field, at about the distance of two feet and a half one from the other.

In

* *i. e.* a dung-heap.

† Dunghills should be frequently turned, during the summer season, not only to make them rot equally, but also to destroy the weeds that are apt to grow on them; for if these weeds are suffered to perfect their seeds, they will shed them on the dung, which will then of course do more hurt than good to the land, by stocking it with a variety of weeds, very difficult to be extirpated. O.

In these furrows the beans are dropped singly by women who are accustomed to the work, and do it very well ; but if they cannot get women enough, a seedsmen carries them in a box, and sprains them thinly out of his hand as he walks by the side of the furrow : the whole is then harrowed over, and in this manner the sowing is finished.

By thus sowing their beans in rows, with intervals, they have an opportunity of always keeping their land clear of weeds, and of giving the beans, whilst growing, fresh supplies of nourishment by frequent tillage. Such weeds as grow among the beans, in the rows, are pulled up by hand : as to the weeds that grow in the intervals, they have a much more expeditious way of getting rid of them ; and this they effect by means of a shim, or brake-plow, drawn by one horse, with which a man, and a little boy for a driver, will clear of weeds two acres, or two acres and a half, in a day. They sometimes use two of these shims together, when a man or boy goes between the horses to guide them. In this manner a great deal of work may be done in a short space of time.

The shim consists of a frame of wood, in the two side-pieces of which are mortises to admit the cheeks of the share, which have holes in them to be raised, or lowered, by means of iron pins, at pleasure. I have herewith sent you a drawing of this shim, by which the form of it may be much easier comprehended than by any description I can give in writing *.

AA, are the billets to which the horses traces are fastened : BB, is the iron share, something like a hoe, generally broad enough to clear an interval at twice : cc, are two iron pins which are put through the holes in the cheeks of the share, to raise it higher, or let it down lower.

This then is the instrument they use to keep their beans clear of weeds : it is a kind of horse hoe, or cultivator, very simple in its construction, yet of infinite use. At the same time that it cuts up the weeds, it loosens the earth about
the

* See fig. 2. pl. 1.

Fig. 1.

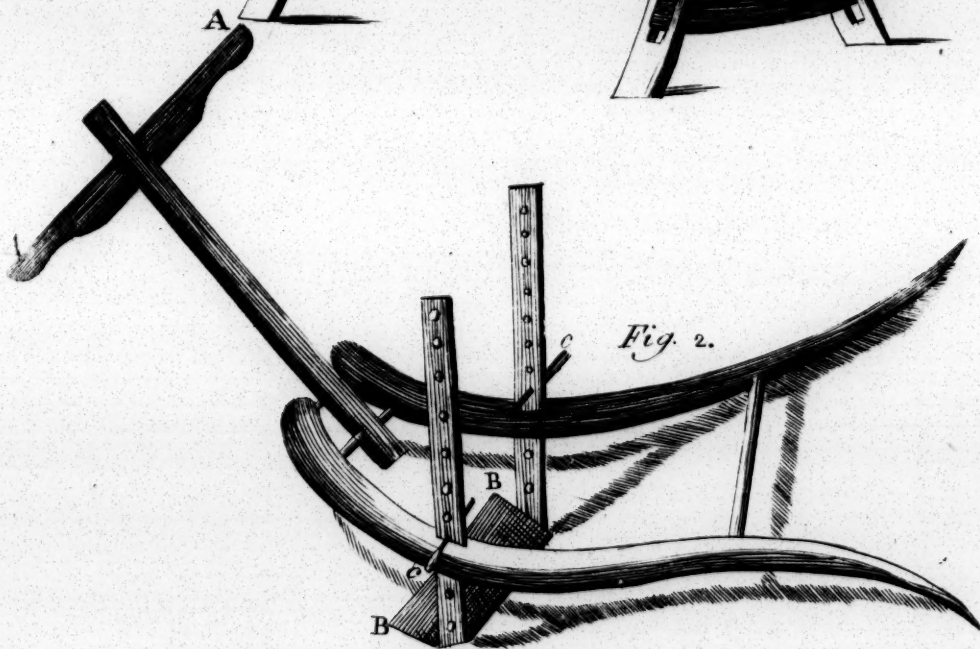
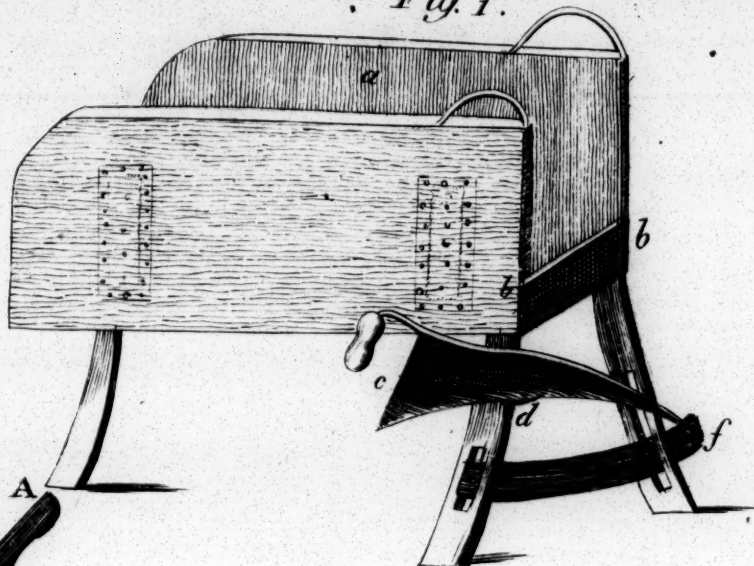


Fig. 2.

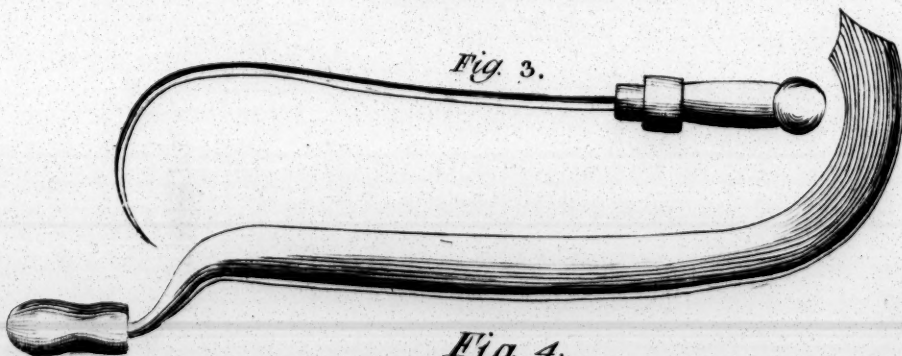


Fig. 3.

Fig. 4.



the roots of the plants, and gives them every hoeing a fresh supply of wholesome food *.

To this may we ascribe the flourishing state of the bean-crops in this neighbourhood: the plants have room to spread their roots, and branch in their stalks; they enjoy all the benefit they can receive from the influence of the sun and air; and, by means of the intervals, they enjoy a frequent and repeated tillage during their growth. Horse-beans, in general, love a stiff soil; but, by mere dint of good husbandry, these farmers get large crops of beans on land which a common observer would not think capable of bearing scarcely any at all.

When the beans are full podded and ripe, which may easily be known by their appearance, the better sort of farmers cut or reap them in a manner almost peculiar to this part of the kingdom.

The workman has in his left hand a hook of iron, called a *hink* †, having a wooden handle like a sickle, or reaping hook: with this they gather the beans together, and afterwards immediately cut them with an instrument called a *twibil* ‡, which they have in their right hand. In this manner they dispatch a great deal of work in a day.

Some farmers pull the beans up by the roots; but this is when the crop happens to be but thin.

After the beans are either cut or pulled, they let them lie in rows on the ground till they are dry, when they bind them up in bundles, with bonds made of wheat-straw; the ears of which have been previously threshed.

Of the *hink* and *twibil* I have also sent you a drawing, by which your readers may readily conceive a proper idea of their use ||.

What

* Too much cannot be said in commendation of tillage bestowed on crops during their growth. E.

† See fig. 3. plate 1. ‡ See fig. 4. plate 1.

|| The regularity with which these beans are sown, makes it much easier to cut them with the *twibil* and *hink*, than if they were sown at random. Upon the whole, we cannot enough recommend this method of cultivating either horse-beans, or broad beans. O.

What I have said, respecting the culture of horse-beans in Thanet, may possibly induce your readers to entertain a favourable opinion of the principles of the new husbandry, to which it very nearly approaches: in fact, there seems to be no difference, except that the seed is not sown out of a drill box, which would be, perhaps, a more regular way of doing it, as well as less expensive, than to have women drop the beans in the furrows. I am,

GENTLEMEN,

Margate, Nov. 15. 1763.

Your most humble servant,
RUSTICUS.

N. B. If the single rows were planted at three feet distance, and the intervals horse-hoed with the small horse-hoe plough made by Mr Crichton, by ploughing a single furrow from each row, then, after lying for some time, ploughing it back again, and repeating the operation, this would give the land a much superior preparation for the ensuing crop, and a better supply of nourishment to the growing crop, than the skim, which only scratches the surface. C.

H O R S E - B E A N S.

MUSEUM RUSTICUM, Aug. 1764. No 7.

Description of a Drill for sowing Beans, &c. and of a triangular Harrow, both now in Use in the Vale of Aylesbury.

GENTLEMEN,

AMONG many other very useful leading questions in your work, I find the following: "In what manner might the drill-plough, by being made less complicated, be brought into general use?" I have long wished to see an answer to it, and am the more surprised that none has been

been given, as there are two sorts of drills now in use in the vale of Aylesbury, in that part which lies between Aylesbury and Tame, both which are very simple in their construction, and may very easily be made to sow wheat, as well as beans, for which only they are now used.

One sort of these drills is made upon Tull's principles, though not exactly according to his plan. It consists of a single drill-box : the cylinder is about four inches diameter, and has nine or ten holes to turn out the beans. The wheel is twenty inches diameter ; it is fixed to the plough-beam by hinges ; and the beans drop a little before the coulter, so that they are immediately covered by the earth from the broad board.

The inconvenience of this drill is, the time lost in turning it over the plough-beam at the end of the land, and that the team must stand still while the drill-box is filling with beans. These impediments, upon a moderate computation, hinder about a quarter of a day's work.

Therefore, I prefer the other sort of drill, which is made like a wheel-barrow ; a draught and description of which I have here sent you.

A man drives it up the furrow just before the plough : but as I think I have a little improved upon the common method of cultivating drilled beans, and as it perfectly answers my expectation, I have here sent you my method in as few words as possible.

First, I plough two furrows on each outside of the land, but sow no beans in them * : I afterwards drill the three next furrows : then I plough two furrows without drilling any beans in them, and so on, sowing three, and leaving two, for intervals, till the land is finished.

When the beans are about two or three inches high, I plough two furrows up each interval, turning the furrows from the beans, so as to make a ridge in the middle of each

* Two rows a foot distant, or four feet eight inches ridges will be kept clean at half the expence of the above, prepare the ground better, and yield as good a crop. C.

each interval. I have a little plough on purpose for this use, about half the size of a common plough, which is drawn by one horse.

This work should be done after a rain. This year, on the fifteenth of May, we had rain. I therefore went to plough in the intervals on the eighteenth, and continued at plough till all were finished. On the eighth of June we had rain again. On the ninth of June I went to harrow the intervals, with the triangular harrow, as per plan: About a week after that we had more rain. I then went to harrow again, going up the interval I went down before, and down that which I went up: this is what we call cross-tining. Thus my land is laid quite smooth; it is kept clear from weeds; and the beans have a fine loose mould to strike their fibres into; and it is by far the cheapest way of weeding beans.

If this meets with your approbation, and obtains a place in your valuable collection, I shall think myself very happy in having been, in some degree, serviceable to my country; and perhaps you may hear again from,

Your most obedient, humble servant,

J. L.

The Proportions of the Drill are as follow.

Diameter of the iron wheel, twenty inches.

Length of the box, from A to B, twenty inches.

Breadth of the box, from B to C, ten inches.

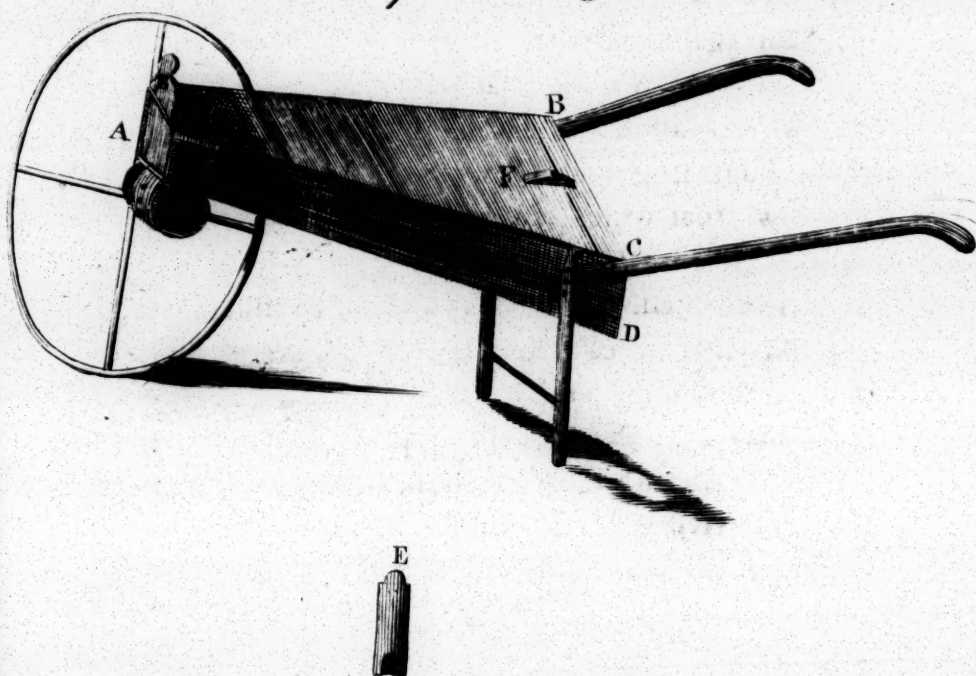
Depth of the box, from C to D, five inches and a half.

Diameter of the cylinder of wood upon the iron axis of the wheel, four inches. This cylinder, you may see, turns out the beans regularly.

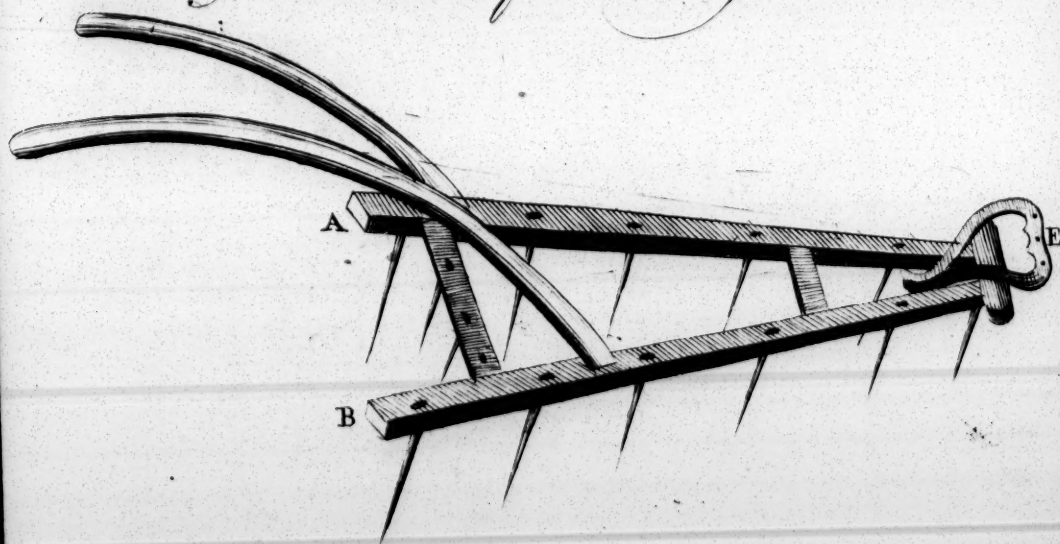
Length of the cylinder, two inches and a half. On this cylinder are twenty-one holes, a quarter of an inch deep, and half an inch diameter.

E, is a tongue which drops upon the cylinder, and plays up easily: the tongue is half an inch thick, seven inches long, and one inch and three quarters wide. When a
larger

A Drill for sowing Horsebeans



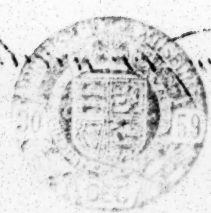
A triangular Harrow for weeding Horsebeans



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larger bean than ordinary comes, it will throw the tongue up, which naturally recovers its place again; and so the work goes on well and even. The tongue is represented with its notch at E: the notch does not go quite through it: it falls exactly upon the holes of the cylinder.

A lid takes off to put the beans into the box, and buttons down at F.

The Harrow.

From A to B, eighteen inches.

The tines nine inches apart.

The three tines in the cross-bar are only three inches and a half apart.

E, a cock, which plays upon a pin, in which are three holes to hang the whipple-tree in. If you put it into the upper hole, the tines bear very hard upon the ground: I generally use the middle hole.

H O R S E - B E A N S.

MUSEUM RUSTICUM, Sept. 1764, No. 32.

On the Culture of Horse-Beans in a light Loam, and the Benefit of hoeing Crops in general.

GENTLEMEN,

MANY farmers imagine that it is in vain to attempt getting a good crop of horse-beans in a gravelly loam, taking it into their heads that nothing but a stiff loam, or a clay, will yield any quantities, worth attention, of this useful vegetable.

Let me, with your permission, endeavour to undeceive them; for be assured that horse-beans, with proper culture, will grow very well, and yield a pay-rent crop, tho' they are sown in a sandy or gravelly loam.

I should not assert this, was I not by experience war-

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ranted

ranted to do it, for I have often raised them on such land to my perfect content.

When I practise this husbandry, it is frequently after a crop of wheat that I sow horse-beans.

The first thing I do immediately after harvest is, to clear the field of the stubble as much as possible ; because if I did not, it would, when buried by the plough, contribute to make the land, already light, more hollow, and would also, as I have often found, make the bean-plants root-fallen : what I mean by root-fallen is, that when the plants become tall and weighty, the roots are apt to give way, and the plant come to the ground ; in which case I have generally found a tuft of stubble near the root, about which the fibres of the roots would twist themselves, instead of penetrating into the soil in search of subsistence and nourishment.

For these reasons, I say, I always get rid of the stubble before I turn up the eddish.

In the first ploughing, I make the ploughman go as deep as he can, that he may lay the exhausted and tired soil, on the surface, at the bottom of the furrow. After this, I harrow it down smooth, and leave it for about a month.

When the month is expired, if the weather suits, I sow the whole surface of the land with lime flaked, after the rate of twenty bushels on an acre.

I then plough the field in broad lands, or wide stiches, harrow it again down smooth, and leave it for the winter.

The first week in February I plough the land once more flat, harrow it smooth down, and have it planted by hand with eight pecks of horse-beans ; immediately after which, a moderate-sized roller is passed over the field.

The beans are planted with dibbles, in double rows, with intervals three feet wide, and the partitions between the rows are only one foot wide.

When the beans are about two inches above the ground, I sow over them, by way of top dressing, about ten bushels of foot, and cause the partitions to be hand-hoed : as
for

for the intervals, I mean the spaces of three feet wide between the double rows, I clean them with a small plough I have for the purpose, drawn by one horse : with this I go one bout in each interval, throwing up two small furrows against the beans, and leaving a trench in the middle.

In about three weeks afterwards I throw back these furrows, and plough as near as I can to the beans, so as not to injure their roots ; but cutting off a few of their fibres gives me no concern : there will now be a trench on each side the interval next the beans.

My next business is to harrow the intervals with a small light harrow, in order to make it as fine as possible ; which fine pulverized earth I now throw back to the roots of the beans, to which it will lie very close, and affords them abundance of nourishment.

I give only one ploughing more to the interval, and that too without an earth-board, as it is only meant to disturb the weeds, and give nourishment to the crop ; and if any more weeds appear, I endeavour as much as possible to destroy them with the harrow ; but if this will not do, I am always ready to be at the expence of having the whole field hand-hoed.

It scarcely need be mentioned, that during all these operations with my small plough in the intervals, I take care with the hand-hoe to keep down the weeds in the partitions between the rows.

With this culture I have seldom failed of good crops ; and if the summers happen to be wet, my crops have often been surprisngly large, and I have got a great deal of money, as, after a wet summer, beans always sell well ; and indeed it is natural they should, as most of the crops on damp stiff lands are ruined, and they are seldom sown on any other.

I do not think I lose any thing by allowing three feet intervals, as the bean-stalks are stronger, and blossom lower, by this practice ; and in the rows they are as thick as they can stand, which I think best in a light soil.

When my beans are hooked, I pull up the stalks ; and my

my next crop is, for the most part, barley, of which I generally, in this way, get at least four quarters an acre.

I sow it on three ploughings, for nothing loves a fine tilth better than barley : and indeed it receives great benefit from the frequent culture that was bestowed, the year before, on the beans during their growth.

My fourth crop is often peas, on which I bestow a little very rotten dung ; and after the peas, without any fallow, I get the land in order for wheat, which I sow with no other manure than coal-ashes, wood-ashes, or foot, whichever I can best get.

It may be asked, perhaps, why I do not dung my wheat ? To this I answer, that my opinion is, that dung breeds weeds by the multitude of seeds of noxious plants which it brings on the land. For this reason I rather chuse to lay on a moderate quantity of dung before I sow my peas, as the frequent hoeings which the peas require contribute much to destroy the weeds, which would otherwise fatally infest my wheat-crop.

This may, perhaps, be new doctrine to many of your readers ; yet I have a very good right to approve of it, as it has so well succeeded with me.

I am, gentlemen, in general, very fond of hoeing crops ; and I am certain, that were they more introduced into common practice, there would be no occasion ever to let land lie fallow ; for the chief use of fallow is, to clear land of weeds : and this may be much better done by encouraging the culture of hoeing crops.

The turnep-husbandry is a very great improvement ; but it is not so well known, or so universally practised, as it ought to be ; and, what is scarcely to be imagined, there are in England farmers, to my knowledge, who sow turneps, and will not be at the expence of hoeing them. How absurd this practice is, need not be pointed out : for my part, I am astonished when I hear of their having a single turnep in return for their seed.

It is in vain to attempt persuading some farmers to alter their old customs, though you should make it ever so evident,

dent, by reasoning, that it is for their interest so to do : they fill their heads with imaginary losses, and nothing but ocular demonstration will convince them of the utility of any practice that may appear strange to them.

It is a great pity gentlemen of fortune do not reside, as their ancestors used to do, on their estates, instead of flocking to the metropolis to spend their fortunes in idle and extravagant luxuries and vanities. I am now forty years of age, have always lived in affluence, yet never was a month together in London in my life. I wish all your gentlemen-readers could say as much.

I am, GENTLEMEN,

With great respect,

Your humble servant,

August 31.
1764.

JOHN MOSS,
A yeoman of Kent.

HORSE - BEANS.

MUSEUM RUSTICUM, Oct. 1764. No. 52.

To the Editors of the MUSEUM RUSTICUM.

GENTLEMEN,

AS one principal intention of your work is to promote improvements in agriculture, you very properly invited a correspondence with your practical readers, in consequence of which, several farmers have been encouraged to appear in it. I have been attentive to their letters, which contain many useful things ; but in regard to the main design, am apprehensive they may not have so general an effect as could be wished.

They inform us of their practice in raising great crops ; but these are not always the most profitable. A great crop, which cannot, by the same assistance to the land, be repeated, or one equal to it, of some other sort, obtained,
may

may be looked upon as a forced crop ; and one such may weaken the land some years : for this reason, an account of one or two great crops is not wholly to be relied on in practice. To form a right judgment of the advantage of such crops, it is necessary to know what were the following ones, till the first come round again in that course of husbandry ; and likewise the expence of all these crops : but as these are not given, and indeed seldom to be expected, it may not be adviseable for a farmer, in another part of the country, to alter his own scheme of husbandry, and adopt a new one, unless he has reasons given him to believe, that, upon the whole, it would be more profitable to him.

The farmers in most counties practise different methods ; and they usually attribute their success to such causes as occur in their practice ; some, to prevent ploughings ; some, to much manure ; others, to hoeing : and, in general, to change of crops. But as they usually combine these together, it is not easy for them to discover which are the most effectual, and least expensive ; though the knowledge of this would be greatly for their benefit, could it be determined with some degree of certainty.

The experiments made by farmers, for their own private use, are, for the most part, inaccurate ; material circumstances are not observed, or forgotten ; and, in one respect, they are very defective. To determine which is the best and most profitable way of agriculture, the several methods ought to be tried together in one field, or in land of the same sort, and in the same circumstances. This is seldom or never tried by the farmers ; and therefore, tho' their methods may be good, they cannot be certain that they are the best and cheapest.

Now, in order to determine this great point, and that the farmers themselves may see and be judges of it, by their own practice, I am of opinion, that if your plan was extended, the farmers might be prevailed with to make such experiments as you, or your correspondents, should point out to them, and give you an account of their success :

cess : for it is observable, that several of your correspondents are not servilely attached to old customs, but deviate from the common practice of the country, by way of experiment.

These are the persons I would recommend to your particular notice. They might be induced to become experimenters, to the general benefit of themselves and others in their neighbourhood. Such trials may be made upon their favourite crops, in small pieces of land, without any loss to them, and with the common instruments ; and when they are satisfied, from experience, which of the different ways is, upon the whole, most for their advantage, more convenient instruments may be recommended to them.

These experiments may be varied, and suited to different circumstances of the land, and plants to be cultivated. Several other persons would probably try them, besides those to whom they are particularly recommended : the neighbouring farmers would be attentive to the progress of them, and make trials themselves, where they saw the other farmers succeed, by whose example they would be more influenced than they commonly are by the experiments made by gentlemen. From small beginnings great effects may, in time, be produced, if any good plan is steadily pursued : and as you may have experiments carrying on under your direction in every county, your Museum would become a repository of the most useful and accurate, and, in that respect, be of great service to the public.

What I have said above, relates principally to corn ; but the plan may be extended to cultivated grasses, and many other plants ; also for introducing more convenient instruments, and many other purposes in husbandry.

If the society for the encouragement of arts would give honorary premiums to those experimenters who most excelled, and pecuniary ones to their servants who executed them, these would greatly excite an emulation ; and in some cases the premiums might be proportioned to the quantity of the crops produced.

It may, perhaps, be supposed, that all this would be attended

attended with much trouble, and take up a great deal of your room; but this will be chiefly at first, for after some leading experiments are published, these may be referred to, and adapted to other cases, without very material alterations.

In order to explain my meaning more fully, I shall propose an experiment to be tried upon horse beans, by Mr Moss, your Kentish correspondent of last month; the rather, as he declares himself to be very fond of hoeing crops, and practises that method upon beans with such care and success. His method appears to be very good, but expensive. Some of the following may be done cheaper, and produce as good a crop of beans, or better prepare the land for the succeeding crop: and they are now proposed to be tried, because this is the season of his preparing the land.

In a field intended for beans, let an acre be marked out, not near a hedge (two acres would be better) This piece to be deep ploughed into two-bout ridges; half of it into three-foot ridges, and the other half into ridges three feet and a half broad. At proper distances of time plough them again twice more; let this be done deep, and still in the same sized ridges. One third of each of these ridges to be dressed with lime only; another third with lime and foot, when the rest of the field is dressed, and in the same proportion; and the remaining third of these ridges to have no dressing at all.

Upon the middle of each ridge plant a single row of beans, at the same time, and as thick, as the rest of the field; and when they are up about three inches high, the intervals are to be deep hoed with a common swing-plough, which should at the first (and every hoeing from the rows) go as near to them as can be done, without damaging the beans. If any clods happen to fall upon them, they are to be taken off.

The first hoeing is to be from the rows; one interval to be hoed and the next missed, and so throughout the piece: for the earth is at no time to be hoed away from
the

the rows on both sides at once. At the second hoeing turn back the earth to the rows, and then hoe those intervals (that were missed at first) from the rows. Thus the intervals are every time to be hoed alternately ; and at the last hoeing, the rows are to remain earthed up on both sides.

The times proper to repeat these hoeings will depend upon the condition of the land, and the growth of the weeds, which should never be suffered to grow high. In general, and after the second hoeing, about a month may be sufficient.

Every hoeing is to be performed at one bout ; but if this does not go deep enough, it may be proper to make his light plough follow the other immediately, by way of a trench-ploughing, especially in ploughing from the rows ; for the success much depends upon the intervals being well and deep hoed ; and this may be done at one bout by a good ploughman.

As there will remain, at each hoeing from the rows, a slip of earth next to them, of about two or three inches broad ; these are to be hoed with a narrow, thin hand-hoe, and the weeds drawn into the furrow, that they may be buried at the next hoe-ploughing, which should immediately follow. This hand-hoeing of these slips to be repeated when the weeds appear.

Five such horse-hoeings are performed at four bouts, which is equal to two common ploughings ; and this may be enough for the rows that were dressed with lime and foot : the others, that have no dressing, may have seven horse-hoeings, in order to see the different effects of each method. These seven hoeings are six bouts, or three common ploughings ; but in such land they may be done with two horses, which will diminish the expence.

Mr Moss, or whoever else may make the experiment, is desired to see every part of the work done himself ; and that he will keep an exact account of the time when every thing is done, the quantity of manure made use of, and the crops upon each piece ; distinguishing those that had, and had not, manure ; and such as were more or less

B b

hoed,

hoed, &c. and to keep the same account of every thing performed in the rest of the field, and the crop it produces: and when the beans are threshed out, he is requested to send you the particulars from his journal.

If he is inclined to vary the experiment farther, he may allot another piece for that purpose in the same field, to be ploughed into five-foot ridges, and two rows of beans planted upon each ridge, at a foot distance. Here the intervals are all to be hoed every time, and the partitions hand-hoed. In this way as large, or perhaps a larger, crop may be got than in some of the others; but the expence will be greater, and the land not so much improved.

I shall be glad if these hints are, in any respect, useful; and am,

GENTLEMEN,

Your very humble servant,

Middlesex,

E. S.

October 10. 1764.

P E A S E.

MUSEUM RUSTICUM Nov. 1763, No. 42.

A letter to the Editors, from a Gentleman in Hertfordshire, relative to the Culture of the Hog Pea.

GENTLEMEN,

WE are very fond, in the county I live in, of sowing grey peas, not only by way of changing our crops, but because we imagine the culture they require is of great service to the land, by keeping down the weeds, and bringing the soil to a fine tilth for future crops.

In our light lands we most of us prefer sowing peas to beans, as the latter naturally require a stiffer soil, and do not give us such large returns; neither is the haulm so good, as it will

will not serve for stover for our cattle in the winter, when we are most in want of it ; but the pea-straw is excellent for this purpose, being very nourishing and sweet ; and the cattle are very fond of it, as it agrees very well with them when given with discretion : it is much best when mixed with straw.

All our cattle eat it almost with greediness, horses, cows, and sheep ; but horses that are often put into quick motion should not be fed with it : it agrees best with draught-horses. The grey pea, which we in general sow in our fields, makes excellent food for our hogs, which fatten on them sooner and better than on any other food.

We also give them instead of oats to our horses ; but in this matter we are very cautious, as it is necessary they should thoroughly dry before the horses taste them ; and, indeed, it is by much the safest way to have them first dried in a malt-kiln, when they become excellent provender, and will maintain the horses under the hardest labour : another very particular reason for our farmers giving their horses so many peas is, that they go much farther, and are cheaper food than oats in general are : on this account most of our oats are sent to market.

On our chalky, sandy, or light loams, we sow our grey peas in the broad cast, and plow them in, or else we sprain them in under furrow. This method secures them a sufficient covering, which they would not otherwise have if they were only harrowed in ; but the crop would be subject to be ruined by the least dry weather, which often happens after pea-feed time *.

In these light lands we love to sow early, that the young plant may have all possible benefit from the spring rains, which bring them forward, and make them pod better, by being at the bearing time better rooted.

We sow our peas in this manner on light lands with a
single

 The better tilth land is in when peas are sown, the better will be the crop ; they thrive better, for this reason, on land that has borne first a crop of wheat, then another of barley : all the plowings both sorts of corn had are of benefit to the peas. R.

single plowing *, allowing often five bushels of seed for an acre, when it is sown in the broad-coast way, but three bushels, or at most three and a half, are enough, if the seed is sown in by a man's hand after the plow : and this, indeed, is the best way of doing it, as it not only saves seed, which is often a matter worth attention, but the crop comes up in regular rows, and is easier weeded or hoed.

We generally sow this seed in February, for the reasons above mentioned, contriving to have done before March: the heavy stiff lands we always sow last.

Peas are, in general, very tender ; but some of the hardy kinds will be, to all appearance, dead two or three times in a spring, and yet recover and bear a good crop.

Some sow their grey peas in January ; but this is not so safe a method, as we have often hard frosts in that month; whereas, after the first week in February, the frosts are seldom of long duration.

About a week after my peas are sown, I give my land a rolling, my light land I mean, to settle the earth about the sprouting pea ; and, for this purpose, I generally make use of a tolerably heavy roller, for a light one does little service. Light soils are porous and hollow ; therefore they require pressing, to lay their parts closer together, and keep out the chilling frosts, winds, and cold rains, which would otherwise, and frequently do, destroy the infant plant before it appears above ground †.

Some farmers are great slovens in their pea-fields ; but I always allow my peas one or two hoeings, according as the summer is wet or dry, and sometimes a weeding besides ; and this method I find is of infinite advantage to practice, as the succeeding crop, be it what it may, is always remarkably clear

* For peas to be sown after a single plowing, the land ought before to be in good tilth, and well broke, or the crop will be indifferent. R.

† This practice of passing the roller over light, porous, and hollow land, is to be commended. E.

clear of weeds *, none of those pernicious vegetables having been suffered to perfect their seeds, whilst the pea-crop was on the ground.

By these methods of practice I get very good crops of peas from my light chalky loams; but I do not, in every respect, manage in the same manner on some stiff clayey land I have †.

On this soil I sow my peas somewhat later, perhaps a fortnight; and I allow the land two plowings before I sow my peas, that it may be loosened, and made as hollow as possible, being by nature too compact and close. I here sow peas in the broad-cast way, and harrow them in; but I do not roll them, as it would be apt to knead the land, and form a crust on its surface, which would prevent the tender shoot of the pea from being able to make its way to the air.

I also allow less seed, at most three bushels, often not much above two, for an acre; and this heavy land does not require so much weeding or hoeing, as the weeds are not here of such ready and quick growth.

I have, as well as many farmers who live near me, yet another method of sowing these peas, and that is on land that is of a middle nature betwixt light and heavy. My usual practice then is to sow half my quantity of seed broadcast, and plow it in; after which I sow the other half on the same land, and harrow it in with a long-tined harrow, in the same manner I do on my stiff lands.

Again, on some stiff spewy land I have, I sow my peas in ridges, to keep them from too much moisture; but when I sow them this way, I am under a necessity of hooking instead of mowing my crop, which is an inconvenient and slow method; therefore, for the most part, I think, to be avoided.

These

* If peas are sown thick, they naturally keep down the weeds; but if sown in rows with any kind of intervals, hoeing is necessary E

† Sowing peas on stiff lands should, if possible, be avoided: beans are much best for such soils. N.

These then in general are the methods we pursue in this county in the culture of the grey pea ; a corn which we are very fond of, and not without reason, as an intermediate crop.

We often, indeed, suffer by this our fondness ; for if a dry summer comes on, the crops of peas in a whole district are sometimes destroyed in a trice by slugs, which are very greedy of this food, on account of the particular sweetness of its sap.

We have no certain method of guarding against this dreadful evil, any more than against the ravages of game and field-fowls, such as pigeons, &c. which destroy great quantities of the seed immediately after sowing : all we can do, is to allow such a quantity of seed, as that, after all these losses, there will still be enough left to supply a full crop ; and this, indeed, is the principal reason of allowing, for our light chalky lands, so large a quantity of seed as five bushels, which would be at least as much again as would be necessary, was it not for the ravages above mentioned.

This may not, perhaps, be the last letter you may receive from,

GENTLEMEN,

Your most humble servant,

Hempstead, Sept. 15. 1763.

A GENTLEMAN FARMER.

THE TCHES or VETCHES.

MUSEUM RUSTICUM, May 1764. No. 59.

A Letter from Mr Smith to the Editors, on the Advantages to be derived from the Culture of Vetches.

GENTLEMEN,

IT would certainly be of great national advantage, could our stock of cattle and sheep be increased without diminishing the quantity of our lands that are in tillage.

This

This can no otherways be done, but by encouraging the growth of artificial pastures, which the farmers have of late years fallen into.

The turnep-husbandry is not of very old standing in this island, yet has it made a very rapid progress. The immense utility of it, when properly practised, cannot but be evident, even to an ignorant common farmer, on the slightest inspection. This evident utility of it has occasioned its being almost universally practised in the counties of Norfolk, Suffolk, and Essex, whence it has spread to other parts of England, and is of late even adopted in Ireland, where, I am informed, the gentry are very intent on improving their estates.

The coleseed plant has also its utility, and in many places is as universally sown as the turnep. I have, myself, very often raised this crop, as well for feeding sheep, &c. as for the sake of its seed, and have had no little success in this husbandry, being very fond of it, as coleseed is an excellent crop to overpower, choke, and destroy weeds.

Many farmers, who hold land of a fenny or moory nature, will, I hope, be encouraged to attempt this husbandry to their great emolument; a husbandry to which they were before utter strangers; for though they might know the upland practices, this could be but of little use to them.

I wish the burnet-grass, so strongly recommended in several parts of your work, may answer every purpose that is expected from it: it seems to promise very fair from the accounts given of it by Mr Rocque; and if it has not too much prejudice to encounter withal, it may probably succeed, and the culture of it become as universally adopted, as is that of the turnep, or coleseed plant, already mentioned.

So much in general; but the particular reason of my now writing to you, was to recommend to the industrious farmer the cultivation of vetches as food for cattle.

I have often sown this crop with great success, to prepare my land for wheat, and have always found that by growing to a large cover they destroy and choke up a great number

number of weeds, which would otherwise do me immense damage : indeed, I think them, for this purpose, next in rank to a hoeing crop.

When I sow vetches before wheat, I always, in the spending my crop, have regard to the condition of my land*. If my land is not in good heart, but wants mending, I not unfrequently fold my sheep on it, and feed off my crop in the field ; but if it is inclined to be rank, or the wheat which is sowed on it, is apt to run much to straw, I often cut my vetches green, and feed my horses in the stable with them. I find no food agree better with them ; they thrive well, grow fat, and are always in good health and spirits when thus fed.

I sometimes also mow my vetches when they are in bloom, and make them into hay, in the same manner I manage my clover and meadow grafs ; all which I leave in grafs cocks in the field, whilst it is haying, very seldom spreading it, for fear of rain ; and after two or three turns it is generally fit to carry.

The great art in making hay of vetches, is to contrive in such sort, that the leaves do not drop off the plants, which, if left too long, or dried too suddenly, they are apt to do ; and the farmer is to understand, that great part of the peculiarly nourishing quality of the hay resides in the leaf.

I say peculiarly nourishing, because almost every kind of cattle, as horses, oxen, cows, and sheep, is fond of it, and they all thrive on this food amazingly : this I have often experienced, and moreover observed, that they make no waste even of the stalks, which they eat with an appetite.

In this manner I manage for my hay, when I am inclined to have it very fine and fit for my cows and sheep ; and in this manner it is no very difficult matter to get it in
good

* Last year I cut my winter-vetches, and fed my horses with them green, and had them off before the middle of June ; after which the land was prepared and drilled with turnep, which were a good crop. C.

good order, sweet and wholesome : but when I intend it only for my horses, I generally let my crop stand something longer ; that is, till the kid, or pod, is formed, and the seed about half grown within it.

When the hay is made in this last way, the business is much more ticklish, and constant observations must be made to see when the crop is in proper order to cut ; because, if it is left too long, the stalks grow hard and sticky, and the leaves are apt to drop off.

This hay is more nourishing, when cut in this last method, than I can well describe : it answers both for hay and corn ; and with this food my horses will be in good flesh, health, and spirit, and be able to do a great deal of work. I have often proved this to be true, can therefore the better venture to assert it.

I have still another method of making these vetches into hay, which is to leave the crop, till the seed is grown to its full size in the pod, though not ripe : I then mow them, and, when dry thresh them on a cloth in the field ; by which means I procure a considerable quantity of pigeons meat, which fetches me a tolerable good price ; and this pigeons meat sells better at market, than if the vetches had stood till the seed was thoroughly ripe ; for by cutting the crop when the seeds are barely full grown before they begin to harden, they shrink in the drying, and thereby become of a smaller size than they are by nature, and consequently more proper food for pigeons than if they were larger.

I own, the hay in this last method is not quite so good, as many of the leaves will, in spite of all the care that can be taken, drop off, and the stalks will be a little sticky : yet, after all, it serves very well for my ordinary cattle, and even for my plow and cart horses, with the assistance of a few oats.

Vetches are a very good plant to sow thick on land, and when they have formed a perfect cover, to plow them in, in order to the land's being sown afterwards with wheat on one plowing. In this intention they answer to the full as well as buck-wheat, or clover.

When a farmer intends to plow in his vetches, I would by all means advise him to do it some weeks before he sows his wheat, that they may have time to ferment and rot, or the consequences may be fatal to his crop: I once, myself, lost the chief part of a fine field of wheat by this oversight.

I should be glad to see some of your very ingenious correspondents enlarge more than they have yet done on the subject of manures, the nature of the several kinds being very little understood by common farmers; yet is there nothing more dangerous than a misapplication of them; and to this misapplication of manures may we, in a great measure, ascribe the present slovenly method of husbandry practised in most counties, the failure of crops, and the abundant increase of noxious weeds.

I am GENTLEMEN,

Essex,
May 1. 1764.

Your humble servant,
J. SMITH.

THE TCHES or VETCHES.

MUSEUM RUSTICUM, Oct. 1764. No. 44.

Thetches particularly recommended to the Attention of Farmers, as affording excellent Green Fodder for Cattle, and being, when ploughed in, a good Manure for a succeeding Crop of Wheat.

GENTLEMEN,

THETCHES are a grain often overlooked by the farmer; yet are they, when properly cultivated, and applied to proper uses, highly valuable and very beneficial.

They are a very hardy grain, and resist the severity of a severe winter better than most other crops; besides which, they have the additional advantage of growing in almost
any

any soil; but then the farmer is to expect a produce in proportion to the goodness of his land.

I would by all means advise, where it is intended for early feed, or to stand for seed, that the small winter-thetch be cultivated in preference to every other sort, because it is not only hardier, but also, being sown about Michaelmas, it is forwarder, to serve as fodder, or will be earlier ready to mow for seed, which is no inconsiderable advantage; for the thetch being a succulent plant, and forming a very thick cover on the land where it is a full crop, it will be in danger of rotting instead of drying, if it should be cut late, or the harvest-weather should be very rainy; but if the winter-thetch is sown early, it will, in general, be fit to mow in July, or the very beginning of August, when there is less danger.

Few farmers allow more than one ploughing for thetches: I always allow two, notwithstanding what the neighbouring farmers tell me of turning the fresh soil again down to the bottom of the furrow: I find my advantage in this practice, and shall therefore continue it.

I have generally experienced the first week in October, if the weather is fine, to be the very best time for sowing thetches; and I allow only two bushels of good seed to every acre, which I find full sufficient.

I sow them broad-cast on the rough land, as the plough leaves it after the second ploughing, taking care to harrow the field length-ways and cross-ways, in order to cover the seed the better; after which I pass over it a roller, heavier or lighter, according to the nature of the soil and the dryness of the weather, observing, that if the weather is dry, and the soil light, I use a heavy roller, in order to close the pores of the light earth; but if the soil is stiff, and the weather damp, I use a lighter roller, lest I should knead and crust the field over, so as to stop the young shoot of the vetch.

This crop will, in general, choke all the weeds that come up with it; but this must, however, be understood of the smaller sorts, for if there are many large rampant weeds,

weeds, it will be necessary to have them extirpated with the hook.

Thetches afford excellent food for sheep in the spring, make cows give a great deal of good milk, and horses are fonder of them cut green than almost any other food.

The best way is to cut them fresh, and fresh every morning as they are wanted; and if the farmer has occasion for them for this use only, he may sow in the spring, to great advantage, the large thetch, at different times; by which means he will have a succession of crops, which, to give green to his cattle, he should always cut just before the plant flowers, for it is then in its tenderest and most succulent state, and will afford most nourishment; whereas, if he leaves it till the seeds are nearly ripe, the stalks harden, grow sticky, and are of far less value; besides, that many of the lower leaves will, by this time, be withered, or dropped off, and intirely lost.

I must not conclude this letter without mentioning an important use to which thetches are often applied; I mean, a full crop of them is frequently ploughed into the land as manure, to prepare it for a succeeding crop of wheat.

When thetches are sown with this intention, I would recommend the large sort, and that four bushels of good seed should be used, to be sown broad-cast twice in a place: but my way of sowing it is somewhat peculiar when I mean to plough it in; therefore I think it may not be amiss to relate it to your readers.

Most farmers sow it by casting it twice in a place, immediately after the land is ploughed, and then harrow and roll the field; but I proceed as follows.

As soon as the field is ploughed, I sow two bushels, broad-cast, on every acre; after which I harrow it lengthways and cross-ways. When this is done, I sow the remaining two bushels, and then harrow it twice again with a pair of heavier harrows, and finally, scratch it twice over with light harrows to raise a mould, concluding my work by passing a roller over the whole field. By this management I scarcely ever miss of a full crop, which covers

covers the whole land, chokes the weeds, and serves as excellent manure for the wheat that is to follow.

I have always found that this husbandry succeeded best in light, hungry, sandy, or gravelly loams; and a brother of mine, who lives in Bedfordshire, tells me it does very well on a chalky soil, provided there is any heart in it.

The time I chuse to plough in the thatches is just after the blossom fades, and the kid begins to form; and it is really surprising to see what a strong fermentation they raise in the soil.

I have sometimes had my crops so heavy that I have been obliged to mow, or hook up, the thatches before I could plough the land: but this is not often the case; when it is, the farmer has reason to rejoice.

There are, as I hinted in the beginning of this letter, scarcely any soils but the thetch will thrive in, though ever so various in their nature. I am an old man, gentlemen, and in the course of many years experience have sown thatches often on a sandy and gravelly loam, a chalk, though not for ploughing-in, a gravel, a low damp clay, and a perfect brown loam. On all these varieties of soil have they succeeded with me; but I must note, that the farmer may expect a larger crop from a gravel (I do not mean a pure gravel) that has some heart and strength in it, than from the finest loam, which has been, by a long continued course of bad culture, starved and impoverished.

The large thetch may be sown in January, February, March, April, or even the beginning of May, when designed for green fodder; but I would, by all means, have the industrious farmer avoid sowing it before Christmas, for it is a tender plant, and if hard frosts ensue, he may chance to lose his crop.

I fear I have taken up too much space by the length of this letter; but I hope you will excuse it. I am a great advocate for the new husbandry; yet am I one of those who think it best to recommend to farmers the amendment of their old practices, before we should attempt to introduce among them new doctrines which they do not understand,

understand, and which they will, for some time to come, object to, merely because they are new. Believe me, gentlemen, to be, with great truth,

Your sincere well-wisher,

Surry,

And humble servant,

September 15. 1764.

A FARMING GENTLEMAN.

T U R N E P S.

MUSEUM RUSTICUM Nov. 1763, No. 46.

A Letter to the Editors, on the Culture of Turneps.

GENTLEMEN,

PERHAPS there never was a greater improvement in agriculture, than the practice of sowing turneps as food for cattle: the counties of Norfolk, Suffolk, and Essex, are the places where this husbandry is practised in the greatest perfection.

In the last-mentioned county I live, and hold no inconsiderable quantity of land, and have, besides, a little farm or two of which I am owner.

I have many years sown turneps on my land, and find it a great improvement, insomuch that I heartily wish the knowledge of this culture was propagated more than it is over the whole kingdom.

I shall give you, for the public benefit, a few maxims, which may perhaps be of service, and the more so, as I know them to be both useful and profitable.

Land cannot be brought into too good tilth for sowing turneps: they require a deep, loose, well-wrought mould *; and

* Mr Miller observes, that the soil properest for turneps is a light, sandy, loamy earth, not rich; for in a rich soil they grow rank, and are sticky; but if the soil is moist, they will thrive better in summer, especially in fresh land, where they are always sweeter than upon an old worn-out, or a rich soil.

He

and to effect this, discreet plowing and harrowing is the best way. I say discreet, because one plowing, properly timed, is worth three that are out of time. It is a maxim in husbandry, that some land cannot be plowed too much; but we should add, at proper seasons and intervals, or an ignorant farmer might ruin himself, and yet think he had followed the directions that were given him.

A light land requires less plowing, as well as less nicety in the times of plowing, than a stiff heavy soil; and it is also sooner brought into good tilth: two well-timed plowings will often do it; whereas a clayey soil will require three or four, before it is brought into order.

An early plowing will greatly forward the getting a stiff soil into order: the month of April should be the latest that such, when intended for turneps, should be turned up. It may then lie till the beginning of June, when it should be harrowed down with loaded harrows to break the clods, and immediately cross-plowed: about a fortnight after this it should be ploughed for the last time, and immediately cross-harrowed and sowed out of hand with the turnep-seed pretty thick, and scratched with a light harrow to cover the seed.

Light lands, as I said before, may do very well with two plowings,

He says he has seen the roots of the green-topped turnep, which were more than a foot diameter, boiled, and were as sweet and tender as any of the smallest roots. This we readily believe, as having often eat this large field-turnep in the country, and it always proved sweet and good. They do not, in general, grow so large as those Mr Miller mentions. That turneps are sweetest on undressed fresh land, is an undoubted fact; yet will they thrive extremely well on rich manured land, and be very proper for fattening cattle, though not, perhaps, quite so good for the table: this scores of farmers, in Norfolk and Suffolk, can testify; for, where so many turneps are annually sown, were they ever so nice, it would be impossible to find fresh land for every crop. Fortunately there is little occasion for this nicety. N.

plowings, one in the spring, and the other just before sowing at Midsummer *.

I look upon it, that turnep-feed cannot well be sown too thick, for it seldom all comes up, and, of what does get above ground, much is often destroyed by the fly, and slug; so that the plants sometimes, though the seed was sowed thick, require but little thinning by the hoe. In fact, I think it better at first to bestow an additional quantity of seed, than to have to sow two or three times over, as I have been often obliged to do, till I practised this method of sowing thick, which generally succeeds very well with me †.

The beginning of July is the time in which I for the most part sow my turnep-feed: in this matter the grand affair is to hit it off, so that the turneps do not grow sticky or spongy before the winter, and yet are forward enough in their growth to resist the frosts, &c. and be fit food for the cattle in the winter, or in the spring.

To have a good and profitable crop of turneps, it is absolutely necessary they should, at proper times, be hoed, not only to kill the weeds, but also to thin the plants, and set them out at a proper distance.

The proper time for the first hoeing, is when they have put forth their fourth leaf, and the second hoeing should be in about three weeks afterwards: twice is, in general, enough,

* The common season for sowing turneps, says Mr Miller, is any time from the beginning of June, to the middle of August, or a little later; though it is not adviseable to sow them much after; because, if the autumn should not prove very mild, they will not have time to apple before winter: nor will the roots of those which are sown after the middle of July grow very large, unless the frost keeps off long in autumn.

† The quantity of seed generally allowed for an acre is one pound; but we think our correspondent's method worthy of being recommended; and that two pounds, at least, should be sown, and this the sooner, as it is a cheap feed: it is an easy matter to hoe up the supernumerary plants, if they all come up and escape the fly. N.

enough, unless a very following rainy season should come on, when it will be proper to take the advantage of the first fine sun-shine weather, to give them a third hoeing: this, indeed, is often neglected, but I always found it pay well, by the thriving condition it put my crop in *.

As to the distance at which the plants should stand one from the other, that must be regulated by the size of the turnep; but it should be never less than one foot, nor is there occasion for its being more than two: about sixteen or eighteen inches is a proper distance for the common turnep we generally sow about me †.

If the soil, on which the turneps grow, is light and dry, the most profitable way is to feed your sheep on them in the spot where they grew; but if the soil is heavy and stiff, it is best to have them pulled, and carried in tumbrils on to some dry pasture, or on any dry field you want to mend; for, was you to feed them on the land, one half of them, at least, would be rolled in the dirt, trodden under foot, and spoiled.

Land cannot be too rich, or too well dunged, for bearing turneps ‡; and this will bring them forward, and make

D d

them

* The chief advantage of this third hoeing was probably derived from stirring the earth about the roots of the plants, which, consequently, gave them a greater facility of extracting the nourishment, necessary for their growth, from the earth. As to the weeds, after two good hoeings, the turneps will generally have over-topped them. T.

† It is a great fault to leave the turnep-plants too close at hoeing: the distance will, as our correspondent observes, depend on the kind of turnep; but a great deal will also, in this matter, depend on the nature and quality of the soil: if it is very rich light land, the turneps will grow to an amazing size, and the plants should, in that case, be left at near two feet distance: if, on the contrary, the soil is stiff and poor, the turneps will be but small, and the plants may be left at about a foot asunder. N.

‡ This is the Norfolk maxim; but Mr Miller thinks fresh unmanured land is best. N.

them escape the fly better; for when once the leaves become rough, the fly does not chuse to touch them: it is therefore certainly best to encourage them in their growth, and bring them as soon as possible out of danger.

When my young crop of turneps have come up, and I have been fearful of the fly, I have frequently sown over them wood ashes, and sometimes soot *: these have been of great service, especially if gentle rains followed, as neither the flies nor slugs chose afterwards to touch them. But I must observe, that this is no safe remedy, if the weather is dry and hot; for ashes, being of a hot nature, will then be apt to burn up the crop.

As to the slugs, the best way of destroying them in dry weather is with a light roller: this crushes and kills them, and does the crop service, especially if it is light land; for it presses the particles closer, so that the moisture in the earth is not so soon exhaled by the heat of the sun; consequently, the young turneps do not so soon suffer by a continued drought †.

It

* Mr Miller observes, that there have been many receipts for preventing the fly taking turneps, but that few of them deserve notice. He mentions, however, two or three which he had tried with success. The first was steeping the seeds in water with flour of brimstone mixed, so as to make strong of the brimstone; another was steeping it in water, with a quantity of the juice of horse-aloes mixed; both which have been found of use. He adds, that the sowing of soot, or tobacco-dust, over the young plants, as soon as they appear above ground, has also been found very serviceable; in short, whatever will add vigour to the young plants will prevent their being destroyed by the fly, for these never attack them till they are stunted in their growth.

† Mr Miller takes notice of another enemy to a crop of turneps; that is, the caterpillar, which very often attacks them when they are grown so large as to have six or eight leaves on a plant: we suppose he means in the neighbourhood of London, as this accident is seldom known in the country. However, he adds, that the surest method of destroying these insects is to

turn

It is scarcely necessary to observe, that dry weather is best for hoeing turneps in, as then neither the weeds nor the turneps that are cut up are apt to grow again.

In light gravelly or sandy soils, the seed of turneps may be deeper covered than in stiff clayey land: in the first, it may be pretty well harrowed in; in the latter it should only be slightly scratched with a very light short-tined harrow, or even only bush-harrowed; as by that means they will sooner appear above ground, be sooner out of danger, and thrive better afterwards, the apple of the root growing almost intirely out of the ground, the whole nourishment being collected by the tap-root, and by the horizontal roots, which issue from it on all sides.

The quantity of seed to be sown on an acre should be from two to three pounds *, according to its goodness; and many use equal quantities of old and new seed, thinking this method best; for the new seed comes up first, and if the fly takes it, the old seed in a day or two succeeds, and generally fares better.

If a crop of turneps fails, either through any defect in the seed, or by the ravages of the fly or slug, it is usual for the

turn a large parcel of poultry into the field, which should be kept hungry, and turned in early in the morning: these fowls, he says, will soon devour the insects, and clear the turneps. The nature of this remedy convinces us, he must mean, that caterpillars infest turneps near the metropolis, where they are sown only in small plots, compared to the extensive tracts annually sown for feeding cattle in Norfolk, and the adjacent counties. We imagine a farmer, who sows, perhaps, fifty acres of turneps, would be puzzled to find a sufficient quantity of poultry to clear his crop of the caterpillars, should it chance to be infested with them: when it is the case, some other more effectual remedy must be found for him at least. N.

* Even on our correspondent's principle of sowing thick, perhaps two pounds of seed, if it is good, would be found sufficient for an acre of land. A fourth part of that quantity would do, was it not for the many dangers to which the crop is exposed. N.

the farmer to sow the same land again; and this, if there is occasion, he repeats two or three times, till at last he secures himself a crop. For the reason above mentioned, it is esteemed best to sow early, as by that means there will be time, if the first crop fails, to sow another.

Turnep-seed is very apt to take damage from wet, if it is not covered as soon as sown: without this precaution, it will sprout prematurely, malt, or mould: by too early a germination the seed is apt to burst.

When peas are sown on a rich mellow earth, they are apt to grow rank: in this manner they cover the ground, keep the moisture in it, raise a kind of fermentation in the soil, and make it hollow and porous; insomuch that when the crop has been off, turneps have been harrowed in without plowing, and have thriven amain: but there is danger in pursuing this practice without great caution. More I reserve for another occasion. I am,

GENTLEMEN,

Aug. 14. 1763.

Your humble servant,

AN ESSEX LANDHOLDER.

TURNEPS.

TURNEPS.

MUSEUM RUSTICUM, Jan. 1764, No. 88.

Letters concerning the former Transactions of the Society for the Encouragement of Arts, Manufactures, and Commerce; particularly in relation to the Premiums for A Method of preventing the Destruction of Turneps by the fly;—and A Composition for Marking Sheep without Injury to the Wool. Containing several useful Observations and Hints respecting those important Subjects.

To the Editors of the MUSEUM RUSTICUM.

GENTLEMEN,

THE two following letters are at your service, if you chuse to give them a place in your *Museum Rusticum*. The one of them is an inquiry, made by myself, about the former transactions of the *Society for the Encouragement of Arts, Manufactures, and Commerce*, with respect to two interesting subjects: the other is the answer of the gentleman to whom I applied on this account, and whom I conceived to be able to give me those lights I wanted, by his having been particularly attentive to matters of this kind, and a constant frequenter of the society's meetings and committees. I give you the whole as they are, rather than to try to abridge them, and extract the principal matter, as the epistolary form is, perhaps, more agreeable, as well as intelligible, to the generality of your readers, than a more brief and formal manner of treating subjects of this kind.

I am your unknown humble servant,

Y. W.

To

To Mr—— in London.

S I R,

AS you have been so good as to promise to give me, from time to time, an account of any of the matters that fall under the consideration of the Society for the Encouragement of Arts, Manufactures, and Commerce, I may be desirous to inquire after, I will take the liberty, at present, of begging to know what was the result of two premiums offered some years ago: the first, for a method of destroying the fly in turneps; the second, for a composition for marking sheep without injuring the wool, as is now done by the use of pitch. These were articles very well worth the notice of the society; and I am a little perplexed to account why, at the same time the advertisements of the several premiums for them were dropt, nothing was communicated to the public as being deemed effectual; since, I should imagine, such momentous premiums would not be discontinued without the end had been, in some degree, obtained. If, therefore, the least useful information was brought to light, by your proceedings, with regard to any of these articles, I should be greatly obliged to you for imparting it to me; especially as to the preventing the destruction of young turneps by the fly, since any remedy, even a palliative one, for that evil, would be of the greatest service in my neighbourhood. I shall consequently esteem any satisfaction you can give me on this subject, as a favour, and remain,

S I R,

Oct. 6. 1763.

Your obliged humble servant,

Y. W.

To Y. W.

S I R,

I Shall be ever ready to give you all the information I am able, in relation to such articles as come before our society, or any other where I can in the least gratify your curiosity,

curiosity, or be of service to those for whose sakes you make such inquiries.

As to an effectual method of preventing the destruction of turneps by the fly, it is very true the society did some years ago offer a premium; and though I was not a member when the advertisements on that head were first settled and published, yet I attended the committees which took under consideration, the last year of publishing such advertisements, the several methods offered in claim of the premium (for several there were); and which came to a resolution, that none of these, so offered, appeared likely to be effectual. This failure in the success of the advertisements, which, as far as I remember, had been repeated several years; and a notion, which was then very justly started, of the difficulty of deciding on the merits of any proposed methods, that appeared to promise any efficacy, if such should be offered, without going through a set of experiments which could not be made by the society, nor even under their inspection; determined the committee to recommend also the discontinuance of the advertisements for this premium, and occasioned those circumstances, which, according to your letter, seem to you a paradox: and I am, indeed, of opinion myself, that notwithstanding the importance of the object, they were very right in their conduct as to this point; and that there was a far greater chance of their drawing themselves into perplexities and embarrassments, than doing any good as to the thing proposed.

But though I cannot offer you any thing much worthy your notice, taken from the communications made to the society, in claim of their premium for a method of preventing the destruction of turneps by the fly; yet I have a memorandum of one imparted to me, at that time, by a person of fortune, and good sense, who attended the committees that sat on this subject; which was vouched to me, by him, to have been found, on repeated trials, to answer extremely well for this purpose. I shall therefore most willingly communicate the same to you, as a matter, I think,

think, greatly deserving a further examination and trial ; as well on account of the authority of the person who obliged me with it, as from the great plausibility of the principle on which it is founded ; there being, I think, no other principle that seems to promise any practicable means of fully effecting this very desirable matter.

The explanation of the method may, I think, with some little study, be easily obtained by a person of your sagacity and knowledge ; but to save you that trouble, I will give you my own sentiments on it : only, before I enter on this, it will be proper to present you with the method itself, as it was imparted to me.

“ A quantity of turnep-feed, of the last year, must
 “ be taken, together with an equal proportion of some of
 “ the produce of the year preceding that : each of these
 “ quantities must be divided into two equal parts, or halves,
 “ which may be then mixed together. One of these two
 “ parcels, or mixtures of the two halves, must be soaked in
 “ water for twenty-four hours ; and then the other, re-
 “ maining unsoaked, being again mixed with this which has
 “ been soaked, the whole must be sown in the manner com-
 “ monly practised. It must be observed, however, that the
 “ whole quantity of seed used should be double to, or at least
 “ one third more than is commonly used. The conse-
 “ quence will be, that the herb will rise from the seed, so
 “ treated and sown, at several different times ; and the fly
 “ will destroy one part of it, but there will be enough left
 “ to afford a full crop *.”

The

• The drill-plow made by Mr Crichton coachmaker in Cannongate sows the turnep-feed at several different depths ; and consequently the plants rise at different times. I have had new plants daily coming up for a fortnight ; and although the fly took them two or three times, there was a full crop at last. During these last eight years, in which I have used this instrument, I have not once failed having a good crop of turneps, without re-sowing them. I always sow one half old and the other half new feed. C.

The principle on which the effect of preserving the tender herb of the turneps from the fly depends, consists in two circumstances: the one of these circumstances is, that seed, which is of the same year, will spring out of the ground some days sooner than that which is of a former year; and that such seed as has been soaked for a considerable time in water will rise sooner than such as has not undergone such soaking. The other of these circumstances is, that the fly will not destroy the herb of the turnep after it has attained a certain degree of growth, or strength; and that the youngest and tenderest herb will be preferred by it to that which is older, even to such a degree, that the one will be quitted and left for the other, when found near it.

Now it is very easy to apply this in accounting for the efficacy of the method above proposed; for the herb produced by that seed of the same year, which has been soaked, rises some days before any of the rest, and the fly falls upon and destroys a part of it; but the other part of the soaked seed, that is to say, that of the former year then rising, the fly quits the first before it has destroyed the whole, and preys on this only. In like manner, before it has devoured the whole of this second rising, a third tempts it away, that is to say, the unsoaked part of the seed of the same year; and, before this is consumed, the fourth part of the seed, to wit, the unsoaked part of that of the former year, in like manner prevents a total destruction of the other. While this last, which affords a more pleasing repast than any of the rest can now do to the fly, takes it off from them, they gain a sufficient strength and growth to resist the mischief, when it would otherwise demolish them after having dispatched the last: and thus, by diverting, as it were, the enemy, by taking him off to new attacks, a sufficient quantity of the plants escape, and are saved from destruction, to supply a full crop when grown to due maturity *.

E e

I

* This method promises very well in speculation; but we wish it may answer as well in the practice. Is it certain that the soaked seed of the former year will come up before the un-
soaked

I cannot vouch the success of this method, as I observed before, from any actual trials ; but it is certainly very ingenious, and seems so just in the principle, that I can scarcely doubt the efficacy of it : and I should therefore recommend it to your notice, especially as it is of so simple a nature as to require very little trouble or expence. At least, it promises greatly more than any of the several methods laid, by the candidates for the premiums, before the society ; which were either credulous practices of soaking the seed in compositions that had no relation to the end in view ; or such methods as, though perhaps serviceable in some circumstances in a small degree, were yet very inadequate and uncertain, and, if not very cautiously managed, might do more harm than good. Amongst these the strewing of lime and ashes, so as to convey a small proportion of the dust of them over the tender plants, or the burning substances that afford an acrid smoke to the windward of the ground where the turneps grow, were the principal. In the use of lime and ashes, care must be taken to spread them very thin over the young herb : otherwise they would corrode it, and be as sure a means of destruction as the fly itself : but if a very fine dust only be conveyed over it, this will not be the case ; and if no heavy rain fall to wash the dust off, this practice will sometimes succeed very well *. The substances employed for burning, to raise a smoke for destroying the fly, have been usually either

soaked seed of the last year ? or, as there are in the natural state several days difference in the time of their appearance, will not soaking the oldest seed bring them nearly upon a par ? The principle, however, on which this practice is recommended, is undoubtedly good : we would therefore recommend it to our readers, to make the experiment, and communicate to us the result.

* The strewing of coal soot over a piece of young turneps, has, by experience, been found to be of great efficacy, as it not only renders the young plant disagreeable to the fly by its bitter taste, but also greatly helps the vegetation by its enriching qualities. N.

ther green wood, or weeds dried to a proper degree, or brimstone. The last is most effectual; but it is difficult to diffuse it over a large space of ground with sufficient strength to answer the end: and care must be taken not to augment it too much, in any particular place, lest the herb of the turnep itself suffer from it; which may easily happen while it is in this tender state: the expence, moreover, of this is some objection, the quantity of brimstone necessary to produce any material effect being considerable. The method I have particularly explained above, seems therefore to promise much more than can be expected from either of these, and will, I hope, afford the means of preventing this great mischief attending the cultivation of turneps.

I will now endeavour to give you some satisfaction as to the second article you ask after, viz. the premium for a composition for marking sheep without injuring the wool, as is now done by the use of pitch. This premium, Sir, is not finally discontinued by the society, but only a further publication of the advertisement suspended, on account of a claim at present undecided. The proceedings they have had with regard to this matter were as follows. The society was induced to offer a premium for a composition for marking sheep, because pitch, which is now used on account of its cheapness, the facility of its being laid on the wool, and its durability as a mark, is not to be again cleansed out of the wool, by washing with hot water and soap, nor by any of the methods used in cleansing wool; and consequently spoils not only the wool of the part where the marks are made, but also that of any other parts which come in contact with it when the pitch is softened by heat. This occasions the destruction, as is said, of an eighth of the whole of the wool of those sheep that are marked with it; the loss of which to the public has been, on the most moderate computation, deemed 40,000 *l.* annually; and by some, a much greater, even up to 200,000 *l.* This renders the matter a very considerable object with respect to the public interest, and a very fit one of the society's premiums; because there can be no doubt,

doubt, but that a composition of cheap substances may be found out, which will have the properties required for this purpose ; that is to say, be a durable mark, and yet wash out with hot water and soap : and if the society should, by their encouragement, occasion such a discovery, it is presumed farmers, and other proprietors of sheep, would readily use it ; and it might probably be the means of a legal prohibition of the marking with pitch, which has not hitherto taken place in consequence of applications that have been made on that account ; because nothing was at present known that would supply its place for marking ; and the want of durable marks would produce such perplexities and trouble to those who are owners of great numbers of sheep.

However trivial, therefore, a premium for improvement in sheep-marking may seem at first view, to those who are not apprised of these circumstances, it was certainly one of the most judicious and momentous premiums the society ever offered, though it has not hitherto had the desired success. The premium offered at first, for some time, by the society, was, I think, only ten pounds ; but it has since been advanced to fifty ; which is yet much too small ; and probably this is the reason why it has not been effectual. There have been, however, several candidates for each year it has been offered ; all of which, excepting one, of which I shall give a more particular account below, have been rejected on trial. The means of trial, originally adopted by the committee to which this matter was referred, were, first to examine if wool could be cleansed perfectly from the marking substance, when laid on it, by washing it in hot water and soap ; and if the composition appeared to answer well in this point, a skin with the wool on it was marked, and hung out in the air, exposed to the weather and the agitations of the wind, to try the durability of the mark. The compositions produced by the first sets of candidates all failed in one of these two points, and were consequently rejected ; but the last year the premium was
offered,

offered, some gentlemen, who were members, were not satisfied with this kind of trial, but obtained an order, that proof should be actually made of each composition, on the backs of living sheep ranging at large. On the reference of the compositions in claim of this last-advertised premium, the committee, therefore, again proceeded to try the washing in hot water and soap; in which all failed but one, part of all the substances always adhering to the wool in spite of such washing. The one which stood this test was an earth of the ochrous kind, and therefore differed little from ruddle, and those other chalky substances that had been formerly employed, but are now disused on their inferiority to pitch with respect to the durability of the mark they make: but the committee, finding it stand this trial, determined nevertheless the further trial on the sheeps backs the society had ordered; and a considerable quantity being procured from the candidate, it was distributed among a number of gentlemen to have it used on as many sheep as their respective portions of it would mark.

Of the success of this proof no regular account has ever been given to the society by any of them; but some have occasionally mentioned in private the failure of it: and as matters postponed to distant and unfixed times are not taken up again in the committees, unless in consequence of something offered to the society relating to them, or of special motions of some members to revive them, this matter sleeps at present, and possibly the renewal of the premium itself will be neglected. It were greatly to be wished, however, that such a composition were discovered, and either laid open to the public, or sold at a reasonable rate, by the discoverer, to persons who would again retail it in every part of the country; for as the price of wool depends on the plenty, and we have at present so great rivals in the woollen trade, the destruction of an eighth, or according to some, a much greater part of our whole produce, is a great detriment to our national commerce.

I am,

Yours, &c.

T U R N E R S.

T U R N E P S.

MUSEUM RUSTICUM, Jan. 1764. No 80.

A letter to the Editors, on the Benefit of laying up a Store of Turneps against the Winter.

GENTLEMEN,

I Perceive that a person, who signs himself *an Essex Landholder*, has written you a letter, marked No 46. p. 206. on the culture of turneps: his method is, in general, the same I practise myself; it must therefore, of course, meet with my approbation.

Yet, as this piece is intirely confined to the culture of turneps, without saying much about the spending of them, it gives me an opportunity of enlarging a little on this head, by way of supplement to your above-mentioned correspondent's letter.

I have, in my time, sown a great deal of land in turneps, and have applied them with great advantage to various uses; but our chief reason for cultivating them in this county is for feeding and fattening sheep.

It is almost needless to say, that they answer this purpose extremely well: their use is too well known to all the eastern farmers, to be in these days controverted.

We have various methods of spending them: some fold their sheep on the land where the turneps grew; I have done this, but it is not a method I approve of: however, for the benefit of such farmers as chule to practise it, I shall give one caution; which is, that they use wicker hurdles for folding their sheep, which will otherwise be apt to thrust their heads through the bars, and, tangling themselves, are by that means often killed in the night, to the great loss of the owner.

If, however, it should not be convenient to the farmer to get these wicker hurdles, but he should be obliged to
take

take up with those made of reft stuff in form of a gate, let him then be careful, when he has fet his hurdles, and flaked and bound them tight, to pull up all the turneps that grow within two or three feet of the outside of the fold, and throw them over the hurdles for the sheep to eat within side.

This will take away any temptation the sheep may have to put their heads through the bars, and they will, by that means, escape the danger of being strangled.

Every animal is fond of liberty ; and though the sheep will bear confinement, perhaps, better than any other creature, yet whoever has seen them when first driven into the fold, must have observed that they naturally go round the hurdles to try to find an opening to get out at : by this means the turneps which grow near the hurdles are trampled on, dirtied, and spoiled. For this there is a very easy remedy ; let the shepherd only pull up all the turneps that grow near the inside of the hurdles, and all will be well.

I observed before, that I am not fond of giving my sheep turneps as they grow : I think it much the better way to have them pulled ; by this means they have an opportunity of eating the whole root, and my stock of winter-fodder goes much farther ; whereas, when they feed on the turneps as they grow, they generally scoop them out, and leave a hollow shell in the ground, which, though it may afterwards be forked up, the sheep will scarcely even by hunger be induced to touch, as it cannot but be foked by the dung, urine, and dirt, from the feet of the sheep.

I find it then the best way, to have my turneps pulled before they are given to my sheep ; they go much farther, and do them more good.

But in this method there is one seeming inconvenience, which is, that in frosty weather, when the ground is hard, I cannot have them pulled ; yet this difficulty is very easily removed, by laying up, at the beginning of the winter, a sufficient store of turneps, secured from wet, and not much exposed to frost.

I think it worth while to have a building particularly dedicated

licated to this use, and find it answer well; it is built in form of a small barn, and boarded round.

In the beginning of the winter, before the frost sets in, I have a large quantity of turneps pulled, and the dirt is carefully scraped off them; and, after cutting off the heads and tap-roots, I cause them to be regularly laid in my store, with this caution, however, that all round the sides next the boarding my men lay straw, to keep out the frost. The heads, or tops, I give to all my cattle in general, as they are cut off; by which means I, in fact, suffer no loss *.

I find these stored turneps a happy resource when hard weather comes on; then I open my repository, and deal them out to my sheep in such a manner that there may be no waste; and as soon as the weather breaks, and the earth becomes less hard, I resort again to the fields, and have them pulled as usual.

For some years I had another manner of storing my turneps, which was by digging a deep pit in a sandy, dry field, which being filled with turneps, they kept there very well; yet, as this method was subject to many inconveniencies, I left it off.

I have discovered another use for the turnep, besides feeding my sheep, oxen, and cows with it, which I must mention before I conclude this letter. I find it agrees remarkably well with hogs, which will eat of it greedily, and thrive on it apace.

I have several times tried this, and have often killed fine young porkers that had for many weeks eat nothing but turneps boiled in swill, or wash, till they were tender.

I have at other times given turneps to large hogs, that have been put up to fatten, in order to their being killed and salted for family-use; and here I was not disappointed in my hopes; they always came on well: but I made it a custom to give them, for a week or two before they were killed,

* This method is doubtless a very good one: we therefore earnestly recommend it to our readers. O.

led, a few bushels of boiled peas, in order to harden their fat, that it might not boil away in the pot *.

I gave them boiled peas rather than raw, because, having been long used to eating the soft turnep, I found they did not afterwards take kindly to the hard, raw pea.

Hogs may easily be brought to eat raw, unboiled turneps; but it is much better to boil them when the hogs are to be fattened; for, though they will eat enough of them raw to keep them in tolerable good plight, yet they will not eat enough to fatten them apace.

I cannot better finish this epistle than by assuring you, that I approve much of the pieces you have already published: their utility stands confessed, and the great variety of subjects they treat on cannot but make them very agreeable reading to a lover of nature. Let me beg you will believe me,

GENTLEMEN,

Norwich,
Dec. 2. 1763.

Your grateful admirer,

C. K.

T U R N E P S.

MUSEUM RUSTICUM, Nov. 1763. No. 43.

A Letter to the Editors, containing a useful Caution with respect to the feeding of Ewes with Turneps or Cole.

GENTLEMEN,

THE two parts I have already seen of your collection give me reason to think, that your papers on husbandry will be of great use: you honestly own you depend on the public for supplying you with materials: every one therefore should contribute his mite; and it is this consideration induces me to become your correspondent.

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* If hogs will thrive so well, as our correspondent seems to say, on turneps, it will be a profitable acquisition to many poor people, who have it not in their power to purchase much corn.
N.

I have often improved my knowledge by other people's mischances, and am therefore willing your readers should be improved and forewarned by a misfortune which some years ago happened to me.

In some parts of our county of Essex we run greatly on the turnep and cole seed husbandry, reckoning a crop of either almost, if not quite, as good as a fallow for our land.

In the beginning of the winter, or latter-end of autumn, we generally buy in our stock of ewes, for our lands are in general so good, it is not worth our while to breed. These ewes we turn on our stubbles and fallows, and in the winter and spring often give them turneps or cole.

It is now about six years ago since I turned a parcel of ewes into a turnep-field, and another parcel into a field that was under rank cole-feed plants.

They fed greedily in both fields, and on examining them frequently I found they throve and grew fat apace: this gave me great satisfaction, as I imagined the ewes would be fit for sale soon after the lambs were drawn off.

But when the yeaning time came on, I had a dismal prospect; the turneps and cole were such nourishing food, that the lambs had grown too big in the bellies of the ewes, so that many of them could not lamb without help: some lambs were even obliged to be cut away by pieces, by which means I lost above forty lambs, and very near a score of fine fat ewes, that would have been worth to me twelve or fourteen shillings a-piece.

I found, on inquiry, that several farmers had felt, at different times, the like misfortune, but knew not to what cause to assign it: and I should not myself so soon have discovered it, but that I caused several of the ewes that had died in yeaning, to be carefully opened; and, on inspection, the cause of my loss was apparent enough.

I have since acted with greater caution, and never give my ewes much fattening food till after they have yeaned; there is then no danger: on the contrary, either turneps or cole-feed plants contribute to increase their quantity of milk,
fatten

fatten their lambs, and make the ewes themselves sooner fit for sale to the butcher.

I have sometimes, indeed, been obliged, through a scarcity of other feed, to turn my ewes, before yeaning-time, into turneps; but then I am always careful to take them out about five or six weeks before the time they are to drop their lambs: by this means I escape the loss I once suffered.

Many farmers have lost ewes and lambs in this manner; but as every one does not know the cause of their misfortune, your publishing this short letter on the subject cannot but be acceptable to your readers.

Making such matters as these known, is like placing a buoy on a dangerous rock or shoal, which is a warning for the careful mariner not to steer his bark that way *.

I am,

GENTLEMEN,

Essex, Nov. 4. 1763.

Your most obedient servant,

A GENTLEMAN FARMER.

T U R N E P S.

MUSEUM RUSTICUM May 1764, No. 70.

A Letter to the Editors, on the best Method of spending Turneps by feeding Sheep.

GENTLEMEN,

THROUGH the bounty of a generous patron I enjoy a good rectory, within somewhat more than fifty miles from London, where I make it a matter of conscience to reside, in order to perform in person the duties of my cure.

Being naturally of a speculative disposition, given to contemplation,

* We have, since the publication of the first edition of this Number, heard of several accidents happening through the mistake pointed out by our correspondent. R.

temptation, and fond of retirement, I found it necessary for my health to take into my own hands the glebe, which had been long lett to a neighbouring farmer. This I did that I might have some temptation to recreate my mind, by the innocent amusements which every day present themselves to the lovers and practisers of agriculture.

I have had no reason to repent taking this step, as I think my health is improved, my income not diminished, and my knowledge and experience in this very agreeable study greatly increased.

As I seldom let any thing pass unnoticed, the farmers, who live near my house, resort to me on all occasions for advice; and it is my particular happiness, whenever I have it in my power, to remove a prejudice, or establish a useful maxim in husbandry.

Farmers have been said to be a set of men incorrigibly obstinate: I have seldom found them so: we should make all proper allowances: their education is in general narrow, and they have no leisure-time to enlarge their ideas by subsequent reading; besides, they have, in general, but barely wherewithal to stock their farms. Is it therefore to be at all wondered at, that they should scruple to rely implicitly on the assertion of every one who pretends to direct them in the management of their business, and point out to them new methods they never before heard of? I own I should think it much more wonderful if they paid any attention to such precepts.

This is not the way to teach a farmer any improved method of practice.

I could wish that the gentlemen of fortune would be more attentive to the well-doing of their tenants: it is certainly no disgrace for an estates man to be a lover and a practiser of husbandry. In my humble opinion, (I hope you and the public will excuse such an obtrusion), every gentleman ought to farm a part of his estate; a small part I mean, sufficient to make experiments for the advantage of his tenants and neighbours.

Example is generally replete with conviction: for, can
any

any one imagine I would wilfully injure myself, by pursuing maxims which I know to be erroneous ?

I had last winter a piece of turneps intended for feeding sheep ; but my method of consuming them at first astonished my neighbours.

I fed them off by the fold ; but I first turned in some ewes, which greedily devoured all the tops and leaves : when they had finished them, I immediately folded my ewes on a fresh spot.

After the leaves were eat off the first spot inclosed by the hurdles, by the ewes, I turned in some wethers, which eat with a very good appetite the apples of the roots, leaving, however, the lower part scooped out in the ground : these I had forked up, and they were eat by my store-sheep.

My neighbours were convinced my method was right, because I evidently kept and fattened more sheep on the same quantity of land than they did ; yet they begged I would give them my reasons for this my practice.

I told them I would readily comply with their request, and the more so as it might be a means of tempting them to imitate what they saw practised with success.

Continuing my discourse, I informed them that many years experience, and constant observation, had convinced me, that if you turn a parcel of sheep promiscuously into a field of turneps, the ewes and lambs would immediately attack the leaves ; the fattening wethers would, for the most part, prefer the apple of the root ; and the store-sheep, not being nice, would indiscriminately devour both leaf and apple, and even eat the leavings of either of the others.

I farther informed them, that I had frequently observed, that when a parcel of wethers have been turned into a piece of turneps, the farmer, thinking to have no waste, generally kept them in till they have eat the roots clean up. But this is very bad husbandry ; for, after the wethers have eat the most delicious and sweet part of the root, they loathe the rest, which is generally gritty, dirty, and sodden, in-somuch that nothing, but absolute hunger, will tempt them

to

to taste it. In this period they pine, and lose flesh; and by the time they are turned into a fresh bite of turneps, they are but little better than they were at first.

The appetite of a beast that is fattening should be tempted, not palled; and undoubtedly, such of the sheep as are most forward will be most delicate; and this delicacy, if the farmer is wise, he will indulge, as it will eventually turn out to his advantage.

Thus, in my manner of feeding turneps, the ewes come first, because they prefer the leaves; the wethers that are to be fattened follow, and make the most pure and sweet repast; and the store-sheep, which are the least nice of any, come last, and clear off the remains; at least, as much of them as they ought to be permitted to eat; for I do not hold it good to oblige them to eat what are in a half putrefied condition, and sodden with dung and stale.

My neighbours were so well pleased with my reasons, and so well convinced by what they saw, that they are determined to adopt my practice; and if any of your readers should be of the same mind, it would give me great pleasure, as I cannot feel a truer joy than what results from my endeavours to be of service to my fellow-creatures.

I am, GENTLEMEN,

Northampton,

Yours, &c.

May 3. 1764.

CLERICUS.

CARROTS.

C A R R O T S.

MUSEUM RUSTICUM July 1765, No. 5.

An Account of the Culture of Carrots, and their great Use in Feeding and Fattening Cattle, as practised by Mr Robert Billing, Farmer, at Weafenham All-Saints, Norfolk.

GENTLEMEN,

I find it recorded in your work that Mr Robert Billing had a premium given him, by the society for promoting arts, for sowing thirty acres and two roods of carrots for feeding cattle. Now, as Mr Billing has drawn up an account of the methods he used in the culture of his carrots, which has since been published by the desire of the society, I think you cannot do the world a more acceptable service than to insert in your work, which is the only proper repository of improvements in agriculture, an abstract of the above account. Such an abstract I have therefore sent you, wherein the honest farmer's sense is always retained, though I have taken the liberty of pruning off some exuberances.

Mr Billing observes, that the use of carrots for the winter-feed of cattle has been long known and practised in the eastern parts of Suffolk, where it is common to make carrots serve the same purpose turneps have many years done in most parts of the county of Norfolk; besides that many are sent from thence to the London markets: but carrots never have been sown in the latter county, for the maintenance of cattle, till he tried a small parcel in the year 1761, and another in the year 1762.

He thought it prudent, he says, to make those trials before he became a candidate for the premium offered by the society; the hopes of deserving which encouraged him

to

to venture a pretty large and unusual expence, as was the loss of a great part of his winter-crop, and which has thus become the means of making known, in his part of the country, a species of husbandry with which they had before no acquaintance but by hear-say, being above fifty miles from the country where it had before prevailed.

In the year 1763, he sowed thirty acres and an half by mensuration.

This quantity of land lying in three parcels, one, of thirteen acres, bore wheat in the year 1762; one, of half an acre only, had borne clover; and the last, of seventeen acres, turneps that year. The piece of thirteen acres is a cold loamy soil, shallow, and upon a sort of loamy gravel. The half acre is a soil much mixed, upon a moist clay. The seventeen acres may be divided into two parts, the one of fourteen acres, and the other of three. Both are a light and dry soil, newly improved with a marle; the former, an exceeding good-tempered soil, upon a marle; the other, a shallow black sand, upon a kind of imperfect grit-stone, called in Norfolk a carr-stone.

Previous to giving an account of the success of his crop of carrots, and of the use he made of them in feeding cattle, he describes the manner in which he cultivated these several pieces of land, founded as well upon the best information he was able to procure, as upon the observation afforded him by his own experience of the former year.

The wheat and clover stubble he split down with the plough early in the preceding November; and is satisfied, from all the observations he has made since he first begun the cultivation, that whether the wheat-stubble be, as it is called in Norfolk, flat work, or in ridges, or the carrots are to be sown after clover or rye-grass, the land cannot be ploughed too early; so that the frost and snow may have their full effect in mellowing the ground, for the reception of so small a seed; and this is more necessary to be attended to, the stiffer and tougher the soil shall chance to be.

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The land that had been turneps he let alone till the end of January, or beginning of February, thinking this time enough, because the earth was thoroughly cleaned by the cultivation and summer-hoeing necessary for the crop of turneps.

Of the thirteen acres of wheat-stubble, six were dunged for wheat, but not for carrots; four and an half not dunged at all; and two and an half for the carrot-crop only. The clover-land was dunged for the carrots: and of the seventeen acres that had been turneps in 1762, part had been tathed * for the turneps; and the whole crop of turneps was fed off by sheep and neat cattle.

Four pounds of seed on an acre is sufficient: but as the seed is very small, light, and hard to separate and disperse equally on the ground, he was at first a good deal puzzled how to overcome this difficulty; and though he was advised to make use of a mixture of sand, he did not find it answer, because the weight of the sand carried it all to the bottom of the seed-cot: he sows it therefore now unmixed, as they do turneps, after having forced it through a fine chaff-sieve by rubbing.

It will be three weeks after sowing, and sometimes longer, before the carrots appear: this is the principal advantage, besides the difference of expence, that turneps have over them, for the latter are not sown till about midsummer, and coming quicker to the hoe, get the better of the weeds more easily; for weeds do not grow near so fast about midsummer as in the spring.

The carrots lying a longer time before they come up, and continuing afterwards a long time very weak, they are seven or eight weeks before they are fit for the hoe, and in the mean time afford the weeds an opportunity to get strength, in a season too, when unluckily they grow the fastest: Mr Billing is therefore of opinion, that, though it is necessary to sow carrots before turneps, it is better to sow them as late as you can with safety to the crop; for, of his,

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those

* Tathed, *i. e.* where sheep have been folded.

those sown in April on the clover-stubble came much the soonest to the hoe, though later sown.

The wheat and clover stubble were ploughed three times; the piece after turneps but twice, the first time shallow, the second as deep as the staple of the ground would permit; and on this ploughing the carrots were sown.

As it would remove some of the objections to a carrot-crop, and lighten much the expence of weeding, could they be sown later; and as this might be done, could the seed be made to come up sooner, this sensible farmer imagines the seed might be steeped in somewhat that would forward its vegetation, and afterwards sown, when dry enough to separate.

Yet however expensive the strength of the weeds in a carrot-crop makes the hoeing of them, the crop itself is not apt to suffer; for though the young carrots are quite covered in a thicket of weeds before hoeing, and should be buried in earth after hoeing, yet they seem no way hurt if they get clear again, as they will generally do, if they are not cut off, or buried too deep for want of skill, in a fortnight after hoeing.

The Norfolk hoe is six inches wide. If the carrots chance to be tolerably clean, they may be hoed the first time for eight shillings *per* acre; but if much rain, the foulness of the ground before sowing, or the length of time between the sowing and hoeing, or all these things together, have filled the ground full of weeds, the expence of the first hoeing will amount to ten or twelve shillings *per* acre.

About ten days or a fortnight after hoeing, they should be harrowed: this will displace the weeds and prevent their growing again, which many of them will probably otherwise do, especially if it be showery weather: the harrowing does not hurt the carrot-plants, but, on the contrary, does them much service, by bringing fresh earth to them, as well as killing the weeds.

About three weeks after the harrowing, in case it has not perfectly cleaned the ground of weeds, or in case new
weeds

weeds come up, Mr Billing hoes the carrots a second time, which costs about four or five shillings *per* acre, as the ground is more or less foul; and after this, if there still remain any weeds, which will be the case if much rain falls in the time of the second hoeing, a second harrowing is bestowed.

Where the weather has been favourable, and those employed to hoe have done their duty, the carrots once hoed and harrowed have been as clean as those on which two hoeings and as many harrowings have been bestowed.

Mr Billing next proceeds to inform us of the success he had, in the year 1763, on the several parcels of ground first described. His carrots proved best on the piece of two acres and a half that had been wheat, not dunged for the crop of wheat, but dunged for the crop of carrots, and on the half acre clover-stubble dunged for the carrots.

Many carrots out of both pieces measured two feet long each root, and in circumference at the upper end, those on the former from twelve inches to fourteen, and on the latter from twelve to sixteen inches; a difference of bulk owing, perhaps, both to the difference of soil and the effect of former crops.

On the two acres and half Mr Billing computes he had from twenty-two to twenty-four cart-loads *per* acre, and about fifty-five or fifty-six cart-loads on the whole: the half acre on clover-stubble produced about twelve loads; the six acres and half dunged for wheat, but not for carrots, produced from eighteen to twenty cart-loads *per* acre, and in the whole about one hundred and twenty-four loads; the four acres not dunged for either wheat or carrots, produced from twelve to fourteen loads *per* acre, and in the whole make fifty-two loads.

He had but an indifferent crop of turneps the preceding year, on the seventeen-acre piece, but had from sixteen to eighteen cart-loads *per* acre of carrots on fourteen acres of it, but a very poor crop on the three remaining acres; so that he computes he might have on the seventeen acres after turneps not quite two hundred and seventy loads, which
make,

make, with the former, about five hundred and ten loads of carrots, equal in use and effect to near one thousand loads of turneps, or three hundred loads of hay, as experience has convinced him in the various ways he has tried them.

Mr Billing thinks it is not improbable that he might besides lose five or six loads, which the poor people took, instead of a single load they might have stole, had the land been with turneps; but this loss will evidently be much lightened, should the growth of carrots become general in the country.

The best method of drawing the carrots is with a four-tined fork, with which a man breaks the ground six or eight inches deep, very carefully, without injuring the carrots; and is followed by a little boy, who gathers the carrots and throws them in heaps.

Our farmer began to draw his carrots for use about three weeks after Michaelmas; but as the cattle he meant to feed on them had never yet been used to so hard a feed, he thought it best to give them, at the same time, both cabbages and carrots, lest they should suffer by a distaste at the beginning.

He had about forty load of cabbages growing on one half acre, equal in use, as appeared on trial, to about seventeen or eighteen loads of carrots. He observed, that cattle of every sort naturally eat the cabbages as readily as they would have done turneps; and soon after, having gradually learnt to eat carrots, began to prefer them. Both the cabbages and carrots, and afterwards the latter with turneps, were brought from the place where they grew, to a pasture-cloze; and without any other preparation than shaking off the dirt, they were dispersed on the ground for the cattle to feed on promiscuously.

From the experience Mr Billing has had in fattening cattle on turneps in houses or stalls, he says he well knows, that by this means the carrots might have been made to go a good deal further; but, besides the great trouble attending this method, especially if the number of beasts be great, and the hazard of the beasts foundering in their way to London,

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an accident that often happens to stall-fed cattle, and that the benefit of their stale is lost to the ground, he is convinced the beef is not so good, though, perhaps, more slightly.

The first stock he began to feed in this manner were twelve neat beasts, and forty-nine shearing wethers, that is, not quite two years old: ten of the former were Norfolk-bred steers, and began to feed on the first carrots he drew: at the same time he put on a cow and a heifer three years old. At Old Martinmas Mr Billing bought seventeen Scotch bullocks; which, with a cow from his dairy, made up the number thirty; and soon after he increased this number to thirty-three, by adding three more from his dairy.

It is, however, to be observed, that when the cabbages were spent, he allowed a load of turneps each day for some time for this stock of cattle, which, with three loads of carrots, was a sufficient provision for them. This enabled him to determine that one load of carrots is nearly equal to two of turneps; for of the latter it would have cost him little less than seven loads, computing on the experience of many years fattening cattle with turneps; yet he never knew cattle thrive faster.

Nine of the steers were sold fat in Smithfield the seventeenth of February, and weighed about forty Norfolk stone, that is, seventy London stone each. Another steer and cow were killed in the country, the last in Weasenham town, which died very fat, about the same time; the Scotch were sold at St Ives the beginning of May: the steers sold in Smithfield for about seven pounds fifteen shillings each.

Our farmer being told the market was then low there, sold the Scotch, all but one, at St Ives, where they rendered him about seven guineas each.

The former cost about four pounds ten shillings each; the latter, three pounds fifteen. The other Scotch he sent to London, where, though it weighed but little above sixty stone, it sold for eight pounds, and was said to be some of the

fatteft

fatteft beef killed in London that winter, as the falefman, Mr Brownfworth informed him: the others were not inferior.

The forty-eight wethers were fold fat at St Ives in the month of May, for about fifteen fhillings each.

Thefe thirty-three beafts, and forty-eight fheep, rendered Mr Billing, according to his computation, profit about one hundred and twenty pounds; out of which, allowing one tenth for the fhare the cabbages and turneps had in fatting them, which is rather too much, efpecially as the cattle foon began to leave the turneps, there remains one hundred and eight pounds to be carried to the account of the carrots.

The large quantity of carrots our induftrious farmer had growing, gave him alfo an opportunity of trying their ufe in feeding dairy cows, fheep, horfes, and hogs.

In the month of April he found he fhould have nine or ten acres to fpare, beyond what was neceffary to complete the fatting his bullocks. This happened too at a time when his turneps, as well as his neighbours, began to decay, and enabled him to fupply that defect, to which the Norfolk farmers are very fubject in the fpring of the year, and which no method of managing their turneps did ever exempt them from, when the weather is wet and frofty by turns; and from this decay the carrots feem protected by their hardnefs. From this time he fed his whole dairy of thirty-five cows, and his flock of twenty-one fcore of fheep, on carrots.

At the fame time he thought of a method of getting the carrots out of the ground with more eafe and expedition than he had before done, which was of great ufe when he had other occafions for his fervants; befides that it prepared the land better for the enfuing crop.

They were ploughed up with a narrow-fhare wheel-plough: going flow, the fhare opened the earth, and cut very few of the carrots. Thofe few were fuch as chanced to meet with the point of the fhare.

The plat, or earth-board, turned moft of the carrots out of the ground, and, by harrowing afterwards, were moft

most of them quite cleared from the earth: although the roots extended a good way into the ground, and below the pan, he did not find it necessary to plough so deep, and consequently the land suffered no damage, which otherwise it might have done, as some few of the carrots, instead of being turned out, were buried: at the same time it was necessary to plough the land, and harrow it a second time; and though this should be at an interval of a month, the buried roots will take no harm.

Mr Billing turned his dairy of cows and flock of sheep on this land after the ploughing, without any trouble or preparation, and had all the reason in the world to be pleased with the event: both took readily to eating the carrots, though he thinks the cows most so.

These last, not only all of them gave more milk than usual at this time of the year, but many of them continued to give milk, which would, with such turneps as he had then to give them, have been nearly dry: the butter made was likewise much better than from turneps, and both sheep and lambs did much better than he ever remembers them to have done at this season of the year: besides this, the land received great and manifest improvement from the sale of the cattle, of which he found the benefit apparent in the succeeding crop.

It is proper to observe, that in this method, some few of the carrots will continue buried even after a second ploughing; but these were turned out upon a third ploughing, when barley was sown, and were clean eat up by the flock of sheep, without the least injury to the new-sown barley.

In this manner the cows and sheep were fed for three weeks, which Mr Billing values at above twenty pounds; and, considering how he might have suffered had he wanted turneps, and not been able to supply the want with carrots, he thinks he might value this feed at a good deal more.

In November 1763, he began to feed sixteen horses, which did all his farming work, with carrots: they had neither hay nor corn, except the team that carried out his corn to Brancaster, a sea-port at fifteen miles distance: to this team

team he allowed a bushel of oats a day for the whole team ; the rest, besides carrots, had nothing but peas-straw, and chaff, until the sowing barley : in April he increased their work so much, that he thought it necessary to give them a few oats ; but they continued chiefly to subsist on carrots, until they were turned to grass the latter end of May.

Mr Billing declares he never knew his horses in better order, or do their work better ; and they were so fond of carrots, that he frequently found, that when the team spoke of before were so fatigued that they refused to eat their corn, they would eat it mixed with the carrots chopped.

It may be proper to observe, that for his horses he always chopped off the heads and tails of the carrots, and sometimes gave them another cut. Though he could not find it was necessary, he washed them too for the horses : none of which trouble he found at all necessary, or even useful, for other beasts : the gathering and removing the carrots, and dispersing them about the pasture-land where he fed the beasts, the weather clearing the roots, were sufficient.

Mr Billing gave the sixteen horses two loads of carrots every week ; and these two loads he computes saved him more than a load of hay : this saving was for twenty-eight weeks ; so it saved him twenty-eight loads of hay, which, at twenty-five shillings a load, amount to thirty five pounds.

To this might be added, the benefit received by swine, to which he threw all the tops and tails of the carrots used for the horses ; and they throve exceedingly, and were so fond of them, that he could never find that any dirt that might stick to them prevented their eating them : but as the principal part of the food of the swine was milk at first, and afterwards peas, our farmer has not set any value on this part of his profit ; the value of what he has estimated it on the other articles amounting to one hundred and sixty three pounds.

Of the thirty acres and half, four were sown in the present year with oats, all the rest with barley : the four acres were part of the land where he ploughed up the carrots ; the rest of this piece was sown with barley : both were a
prodigious

prodigious crop, not less than three loads of corn in the straw *per* acre: on the rest of the land his crop was less bulky and shorter, yet very good, perhaps not less grain than the other. And here it may not be improper to mention, that when in a former year he had sown the two ends of a large close with carrots, without dung, and the middle with turneps, for which the land was well dunged, yet, when the whole inclosure was the next year sown with barley, that after the carrots was the best.

Another recommendation of carrots is, that our intelligent farmer finds them a more certain crop, both for growth and duration, than turneps: the latter are exceedingly apt to fail, as well as rot, towards the spring when most wanted. Perhaps the former is in some measure owing to the lands in Norfolk being, as one may say, surfeited of turneps, to which they have been so long accustomed. This is the conjecture of some of their most experienced farmers; but if otherwise there are many reasons for chusing both, that, if one fail, we may rely for so necessary a winter-provision on the other.

This candid farmer thinks he ought not, however, to conceal, that at first beginning of a new sort of husbandry, many difficulties stand in the way: the expence is very heavy, much beyond the expence of turneps, and is, perhaps, increased by the awkwardness of labouring men, and servants, who are both ignorant and perverse about most new employments: besides this, the cleaning of carrots from weeds is much more necessary than of turneps, and yet goes on much slower, so as sometimes hardly to be completed: and moreover, if a long continued-frost should happen, it will be very difficult to get carrots out of the ground, (it is true, the turneps in this case are apt to spoil;) but this inconvenience may, in some measure, be prevented, by drawing the carrots before-hand; though this will be difficult to do, to the amount of fifty or one hundred load.

The above is a faithful and exact account of every material circumstance that has occurred to Mr Billing in relation to the culture and use of carrots, for the feeding of

H h

cattle:

cattle: he is fully sensible that more extraordinary things may be boasted of, upon the most careful attention a diligent and curious man may be able to bestow on two or three acres only; but besides his having been careful to avoid exaggeration in every particular, the large quantity of carrots he raised in the year 1763, gave him an opportunity of judging fully, and without danger of any considerable fallacy, what may be expected from the common use of carrots in feeding every species of cattle on them, in an extensive way of farming.

(Signed)

ROBERT BILLING, Farmer.

The contents certified }
to be true, by }

JOHN FRANKLIN, Vicar.

Nov. 21. 1764.

C A R R O T S.

MUSEUM RUSTICUM, Jan. 1764, No. 79.

A letter to the Editors, on the Uses to which Carrots may be applied by the intelligent and industrious Farmer.

GENTLEMEN,

BLAME me not for wishing to rank myself in the number of your public-spirited correspondents. I see in your collection many hints which cannot fail being extensively useful.

Being willing to contribute my mite towards so valuable a work, I shall make the uses to which carrots may, by the farmer, be applied, the subject of my present letter.

And first, I must mention, that nothing can exceed this root for fattening oxen*; but they should have some sweet
hay

* Much has been said and written in praise of this root, as being a very hearty food for most sorts of animals: it has even been asserted that one acre of carrots, properly planted, will fatten a greater number of sheep, or bullocks, than three acres of turneps, and that the flesh of these animals will be firmer, and better tasted. N.

hay to eat with it, and they will thrive much better on it if they are stalled. They eat it with great greediness; it nourishes them much, and soon makes them fit for the butcher; and if they are young beasts, they always turn out fine meat.

Some oxen will not take kindly to eating them raw at first: for these, it is proper they should for a time be par-boiled; but they must every day be less and less boiled, till they come to eat them quite raw, which in a little time the nicest beast will not be averse to.

I find also carrots excellent for increasing the milk of cows, especially in the winter-time, and early in the spring, when there is a scarcity of grass; and the milk they give when they feed on them has no bad taste; but the butter made of the cream is generally a little high coloured, being a full yellow; yet this is no inconvenience, as it is not worse in quality than that which is made when the cows feed in the summer-months on the sweet meadow-grass.

I have, as yet, had but little experience respecting the use of carrots in feeding sheep: it is true, I have fed a few on them, and they came on well; but whether they are more profitable, when applied to this use, than turneps, I cannot determine. The public would be greatly obliged to some of your readers, if they would make a fair experiment in this matter: the way to do it would be, to pick out of the same flock an equal number of wethers, if possible, equally thriving: let one half of these wethers be put to turneps, and the other half to carrots, being in every other respect managed alike.

Frequent observations should from time to time be made on their health; and when they are fat, it may with great ease be pronounced, which is the food that can with the greatest profit be given them.

If they are equal in their effects, the farmer must always govern himself by his convenience, and which-ever of the crops best suits him, that he is chiefly to cultivate.

Many farmers sow turneps instead of fallowing their land for wheat; and this is good husbandry: but if the foil

soil is proper for carrots, it would be much more profitable for the farmer to sow them, and that for these very obvious reasons; because they impoverish the surface of the soil less, extracting the chief part of their nourishment from a great depth; and as they require that the land should be deeper ploughed, of course it will be in better tilth against the wheat-season, and be in much better order to receive that noble feed.

Hogs are very fond of carrots, and they make them thrive apace; but they should always be given to them boiled, as they will with great difficulty be induced to eat a sufficient quantity of them raw*.

This food fills them speedily with flesh, and will very well make them much more than half fat: it will be proper, however to give them, before they are killed, either a few bushels of barley meal, or some grey peas boiled: either of these foods will complete their fattening to admiration; though, for my particular part, I approve most of the peas, as they make the fat firmer, and waste less in the pot.

Were the hogs to have nothing but carrots given them when they were put up to fat, this root would, it is true, fill them up with flashy fat and flesh; but they would not spend so well; neither would they be so proper to pickle for pork, or to be made into bacon for keeping the whole year round.

I cannot help taking notice of one use to which I have applied this root, as it is quite out of the common road: I have fed dogs with it, and am morally certain that with the assistance of it a pack of hounds might be kept at a much cheaper rate than is now practicable with any other food.

I have not, it is true, experienced this, because I keep no bounds; but I have three brace of pointers, and six couple of cock-dogs, which I have for a whole year together kept on no other food but boiled carrots, some flet milk and barley-meal being mixed with the liquor they were boiled in.

Before

* There cannot be any better food for hogs than carrots. N.

Before I came into this practice, I always used to feed my dogs with either horse-flesh, or barley-meal: when they had plenty of the first, I ever observed that they were remarkably subject to the mange; and if my dog-boy could not for any length of time get the carcase of a horse, so as that my dogs were obliged to eat barley-meal alone, though they got flesh, the barley was of so hot a quality, that their coats would be quite rough, and stand an end on their hides.

Since I have fed them with carrots in the manner above described, I find, with pleasure, that the natural coolness of the roots abates the heat of the barley, or at least qualifies it; and my dogs are always in good order, high wind, and constant health.

This matter is well worth the attention of your readers, as many gentlemen might save large sums of money annually by putting it in practice. I find the use of carrots saves me, at least, three parts in four of the quantity of barley-meal I formerly used; and as to the skimmed milk, if it cannot be got in quantities at a very cheap rate, it may, without any very apparent difference, or bad consequences, be omitted.

Another thing, well worth the attention of your gentlemen readers, I shall now take notice of, which is, that they cannot find a better, or a more heartening food for their hunters, than carrots*, if given them with discretion: as to common plow and cart horses, they may eat them indiscriminately; and this root will be found a very cheap food for them, as they need have no corn, and much less hay than they would otherwise eat.

I have a couple of hunters, which I value as being very good horses; and these I feed in the season with very little else besides carrots, well cleaned from the dirt that naturally hangs about them, and loaves made of the mixed meal of barley and oats, sometimes with a small admixture of coarse, but good wheat-meal; and if they require to be loosened in their bodies, I now and then give them some
brap.

* Horses are extremely fond of these roots.

bran. As to hay, they eat, at this season, but little of it, of oats none at all; yet they go through their work to admiration.

I have, all my life, heard it said, that carrots were exceeding good to make a horse long-winded; and some jockeys will, I have been informed, feed a broken-winded horse some little time with carrots before they sell him, when he may very well be passed off for a horse that is only a little thick-winded.

A horse-dealer in my neighbourhood, when he buys a poor half-starved beast, if he has youth on his side, always fats him up with carrots before he takes him to market; and this practice he finds to answer well, as the horse is sooner got into good flesh with carrots than any other food; and they are besides wholesome, breeding in him no foul humours.

All the danger seems to be to the purchaser, who, if he imprudently puts the horse immediately to too hard work, is in a manner sure to break either his wind, or his heart; for as the horse was very suddenly got into flesh, his strength is not proportioned to his bulk, till he has been kept some time on dry meat, which will bring him about, and make him soon fit for any reasonable work.

That a horse thus fed should not be immediately fit for any hard labour, must not be used as an argument against carrots being a proper food for horses. It must be considered, that this man takes a half starved horse, and gives him at once his fill of a nourishing food, in fact too nourishing, as it fills him with flesh faster than he can have time to gather strength. It must also be considered, that during the time of his being fed on this root, he is not permitted to take any exercise; by which means the free circulation of his blood is greatly impeded, and he must of course be the less fit to be immediately, and without previous caution, put to hard labour.

A horse, in this case, must have a superabundant humidity, which would by perspiration have been carried off, had he been permitted to have exercised himself moderately;

rately; but this being prohibited to him, though the humours whilst he is thriving continue as it were stagnant and innocuous, yet, when once set in motion by too hard labour suddenly given, they naturally become peccant, and shew themselves in different shapes.

I hope I have said enough to vindicate my favourite root from any aspersion *: I have found it very good and serviceable: as such, therefore, I cannot but in justice report it.

If this appears in your collection, I may probably again write to you.

GENTLEMEN,

Dec. 2. 1763.

Your very humble servant,

AN ESSEX FREEHOLDER.

DRILL and HORSEHOEING HUSBANDRY.

MUSEUM RUSTICUM, Oct. 1764. No. 37.

Mr Tull vindicated in his Practice of the New-Husbandry; with some Account of his Experiments, and last-published works.

GENTLEMEN,

BEING of opinion that the *general* practice of the new husbandry would be productive of many and great advantages

* Mr Miller adds another use to which carrots may profitably be applied. He has, he says, known them cultivated for feeding deer in parks, which has proved of excellent use in hard winters, when there has been a scarcity of other food: in such times great numbers of deer have perished for want, and those which have escaped have been so much reduced, as not to recover their flesh the following summer; whereas those fed with carrots have been kept in good condition all the winter, and upon the growth of the grats, in the spring, have been fat early in the season.

vantages to the public, I am desirous that ill-grounded prejudices against it should be removed. Among these, a prevailing one is, that Mr Tull pursued his scheme of raising successive crops of wheat upon the same land so long, that, at last, he had much worse crops than his neighbours; which discouraged people from attempting his method of husbandry.

Mr Miller, in his *Gardeners Dictionary*, under the articles *Hoeing* and *Triticum*, takes notice of this as an established fact, and supposes it contrary to reason and experience that repeated crops of wheat can be raised annually upon the same land, without manure.

One of your correspondents also says, that “ Things may be carried too far; and this was the case with Mr Tull, when, spinning out his principles to too great a degree of nicety, he sowed wheat so long on the same land, without any assistance of manure, that he, at last, had scarcely any crops at all.”

It is certain, that many strange reports were raised of Mr Tull, and his husbandry, by prejudiced persons; and his book being printed for the author, some booksellers were much offended, and employed several hands to write against him, which they did in a most scurrilous manner, asserting many things that were false, and misrepresenting others. Some of these he takes notice of himself, in the additional parts of his work. I shall mention only one instance how ready people were to give credit to such false reports, page 268. “ Last summer,” says he, “ the vulgar in general believed, in a country but twelve miles distant from me, that I always carried my dung and threw it into a river: now there is no river nearer to the barton where my dung is made, than is the farthest part of my land; so that the expence of losing my dung would be greater than spreading it on any part of my farm. Besides, I live in a country where farmers buy dung at a good price; but it is known that I neither sell nor waste any dung. Against such lying tongues there is no defence.”

But a principal cause, that the reports of his bad success

cess in his wheat-crops have gained so much credit, I believe, is, that the Additions to his Essay are out of print, and not generally known; and it is chiefly with a view to inform your readers of them that I write this letter.

Mr Tull began his scheme of successive wheat-crops with four rows. Afterwards he found that three rows were better, and was in that practice of drilling three rows upon a ridge, when he published his Essay. Upon further experience he found, that two rows produced as good crops as three or four, and were more easily managed. This he recommends as his last and best method; and altered his drill-plough to his practice of planting two rows upon a ridge, of which he gives a cut and description in his Addenda and Conclusion. By this alteration his drill is much less complicated, and less difficult to manage, than that for planting three rows, described in his Essay.

The gentlemen abroad who are now promoting the new husbandry, have gone into the practice of planting three rows upon every ridge, supposing that to be the best method; and the drill-ploughs invented by M. Du Hamel, and M. de Chateauvieux, are constructed to sow three rows. Mr Mills also, the editor of M. Du Hamel's Husbandry, tells us, that he declined giving a description of Mr Tull's drill, because it was so complex, which, indeed, it was for sowing three rows; but, as it is now altered, is not so complicated as M. De Chateauvieux's drill, and is easily made a more general instrument for sowing upon ridges, or upon the level; and has this advantage beyond any of the foreign drills that I have seen, that the two wheels which serve to turn the spindle, and deliver the seed, do, at the same time, mark the exact distances of the next rows to be drilled, upon level ground; so that a field, of any extent, may be planted with it, at the distances intended, with great exactness.

From the practice of the gentlemen abroad, and other instances that might be given at home, it is evident, that they have not seen the additions that Mr Tull made to his Essay, in which, besides his different method of drill-

ling, their are several very material improvements in the manner of hoeing and cultivating wheat, and other crops; and from these last parts of his work may be also seen, that the reports of his bad success, in repeated wheat-crops, are without any just foundation.

In order to shew this more clearly, it may be proper to premise a short chronology of the progress of his husbandry, collected from his own account of it; in which it is to be observed, that as the year, at that time, was by some reckoned to commence the first of January, and by others the twenty-fifth of March, and the crops at other periods, it occasions an uncertainty of sometimes a year in this account.

Mr Tull began his horse-hoeing husbandry about	the year	——	——	——	1723
	his successive horse-hoed wheat-crops				1726
He published his Specimen	——	——	——		1731
his Essay	——	——	——		1733
his Supplement to the Essay		——	——		1735
his Addenda	——	——	——		1737 or 1738
His conclusion is dated March 31.	——	——	——		1739
(All these are printed in small folio)					

He died about the year 1741.

As to his practice of raising successive crops of wheat, he made the experiment first upon part of a field, which had not been dunged for some time, and upon this part he continued to raise wheat for twelve years, without the assistance of any manure. In the preface to his essay he says, “The particular scheme of raising annual crops of wheat, without dung or fallow, is as yet only upon probation, but, by the six crops I have had in that manner, I see nothing against their being continued.” In the Supplement, page 249. he tells us, “There is now the eleventh crop of wheat on the same field, (except that in the ninth year, by accident of having contracted to let my farm, it was drilled with white oats,) and I do not yet see any reason against its being continued.”

“tinued for wheat annually, as long as it is kept in this “culture.” In the Addenda, page 261. “The field “which last year had the eleventh crop of wheat,” (as in page 249.) “has now the twelfth on it, very likely to be “a good one.” And in the Conclusion he says, that the twelfth crop of wheat, upon this field, “was the best, I believe, that ever grew on it.”—“It has now the thirteenth “crop, likely to be very good, though the land was not “ploughed crossways;” which he mentions it was the year before, in order to alter the size of the ridges.

I have here collected what he says of this field in particular, as it was his field of experiment, upon which he had raised the most crops of wheat, without any manure.

Let us next see what crops he had upon his lands in general.

He begins his Addenda with acquainting the reader, that he was desired to take an exact account of the crop of an acre of horse-hoed wheat, part of a field of twenty five acres, in order to see the difference between that and the crop of a small piece of ground, drilled upon the level, and hand-hoed. This acre being measured, and the crop reaped, and threshed by itself, yielded twenty-nine bushels and three pecks of clean wheat, nine-gallon measure. But he observes that great waste was made by the reapers of this acre, and some damage was done to the corn by cattle; for which allowance being made, he reckons the real produce of this acre to have been thirty-two bushels, or four quarters, of wheat.

He then proceeds to give an account of the crops of wheat upon his other fields, which, including the above-mentioned field, were in all one hundred and six acres. The corn was not threshed when he wrote this; but it appears, by his account of the crop, as I have computed it, that these one hundred and six acres produced, upon an average, nearly twenty bushels of wheat *per* acre.

If the quality of this land is considered, none of it rich, and the greater part light, and of a thin staple, this cannot be called a bad crop. But there was another very
important

important circumstance, which ought to be considered: Mr Tull was now advanced in years, and in a very bad state of health; was frequently confined to his room, and sometimes to his bed; insomuch that, as he tells us, he had not seen some of his crops from the time they were sown till the spring following. And in his Supplement he says, page 225. "My agriculture having been carried on
 "by common day-labourers, without any body to inspect
 "them, (except when my diseases suffered me to attend
 "them, which, for several years last past, has been very
 "seldom), cannot be expected to be all well managed;
 "for though they can do it well when they please, yet
 "their will being above controul, I must be content with
 "their doing some tolerably well every year."

The dust of the master's feet is a kind of manure so necessary in every scheme of husbandry, that no person of experience in such matters, who reflects upon these circumstances, would have reason to be much surprized, if Mr Tull's crops had really failed as much as has been supposed; and if we also take into the account, that these day-labourers whom he employed, and who had the management of his agriculture at the critical seasons, were then generally, as such men still are, prejudiced against the new husbandry, I think his success, notwithstanding these disadvantages, is a strong argument in favour of this husbandry.

But let us proceed to what Mr Tull says further of these successive wheat-crops. In the Addenda, page 263. he tells us, "I have now six score acres of wheat, an
 "hundered acres of which are on the stubble of the last
 "year's wheat-crop."

And in the Conclusion, page 273. "The crop of the
 "six score acres of wheat, that was growing at the time
 "of publishing my Addenda, was much greater than the
 "crop the year before it, and would have produced more
 "grain in proportion, if the heavens had been as propi-
 "tious; but the heavy rains that fell when the first-
 "planted was most in blossom, diminished the filling of
 "the

“ the ear and its grain, yet not so much as of most sown
 “ wheat, especially of the early-sown, which generally
 “ escapes the best in this common calamity. The burn-
 “ beaked wheat, being always early sown, I am informed
 “ had next to no grain in it; and this is the most expen-
 “ sive sort of husbandry, the tenants pay such exorbitant
 “ fines for the liberty of ploughing this land.”

Again, page 274. “ The same six score acres that was
 “ wheat the last year, is planted with wheat now, and is
 “ all of it as strong and likely for a good crop as in any of
 “ the former years, though there is but about one acre of
 “ it dunged. The whole is the freest from weeds before
 “ hoeing that ever was seen, and the sown wheat in the
 “ neighbourhood the fullest of them.

“ I can shew, at this instant, one of the experiments I
 “ have recommended, which though it be on less than
 “ two perch of ground, must convince every man who
 “ sees it, (and doth not renounce the evidence of his rea-
 “ son and senses), that pulverisation by instruments can vast-
 “ ly exceed the common benefit of manure.

“ ’Tis to such experiments that I leave the progress of
 “ my horse-hoeing husbandry, assuring the public, that
 “ in all my practice, which is now thirteen years, I never
 “ have met with one instance that gives me the least sus-
 “ picion of the truth of the principles I have advanced;
 “ and that, I believe, they have nothing to fear from ene-
 “ mies, but the false relation of facts, or fallacious ar-
 “ guments.”

Mr Tull mentions here, that he intended this to be
 his last crop. He lived about two years afterwards.
 Whether he continued to occupy his farm, I am not cer-
 tain; but if he did, and his crops were worse than the
 preceding years, that could not be justly attributed to any
 error in the principles, but to the other causes above men-
 tioned. We see here that he appeals to an experience of
 thirteen years: nor can it be supposed, or admitted, that a
 person of Mr Tull’s understanding would go on from
 year to year to enlarge his plantations of wheat to the ex-
 tent

tent of one hundred and twenty acres, had he not been fully sensible of the advantage of so doing.

The repetition of wheat-crops upon the same land may, by many persons, be supposed rather a matter of curiosity than of any great use; a change of crops being the general custom, and supposed to be the most profitable: but this is not so clear as some imagine. The custom is founded upon the supposition that change of crops is necessary; which, though it may be true in the old husbandry, is not so in the new; and, without doubt, the change is often hurtful to the farmer; for, not to insist upon the extraordinary labour necessary to prepare the land, and the loss of the season, if it cannot be got into proper order in time, or, which is as bad, sowing it, though not in proper tilth to receive the seed, the main point of all is, whether the profit of these several different crops is really more than hoed successive crops of wheat, or other corn commonly propagated? In answer to this, I believe it is not very difficult to shew, by a fair comparison of both, that the hoed crops are the most profitable, even including the clover and turneps in the old husbandry. Nor is a profitable change of the crop, or the advantage of obtaining sometimes three crops in two years, peculiar to the old husbandry; for the same may be had to greater advantage in the way of hoeing.

There is another circumstance in the old husbandry very unfavourable to the farmer. As he is under a necessity of changing his crops, he cannot adapt them to the soil. Most farms have land in them of very different qualities, and these are not equally proper for the production of plants of every kind. The strong land, that is very fit for beans, wheat, and clover, is not equally so for peas, barley, and turneps. But the farmers commonly vary their crops according to the custom of the country, and the consequence is, that most of their lands are planted in their turn with crops not the most suitable to them; which is an inconveniency that may be avoided in the new husbandry.

Having

Having pointed out the additional parts of Mr Tull's work, it is hoped that we shall soon have a new impression of the whole: and as I cannot, by any means, approve of an abridgment, permit me to recommend the method of printing it, which I apprehend will be the easiest and most agreeable to the readers. It consists at present of so many parts, that it is very troublesome to turn to each of them, in every different point of theory or practice that is touched upon in the Essay; and yet this is necessary to be done, in order to see the whole progress of the experiments, and the alterations, or improvements, made by the author.

To remove this difficulty, I would propose a new impression in folio; that the notes in the essay should be inserted in the text (where they properly come in) verbatim, and without any alteration; that the Supplement, Addenda, and Conclusion, be printed at the bottom of each page to which they belong, by way of notes, distinguishing each by proper marks, or a different character. In this way the whole of the author's sentiments upon each point will be laid before the reader in one view.

The description given by Mr Tull of his drill-plough is obscure, and much too long; and it is to be wished that some practical driller would alter that part. And I am of opinion, that his hoe-plough might be wholly omitted, without injury to the work: being satisfied, from experience, that the common Middlesex swing-plough, or the Rotheran-plough (both which have an iron copse, or bridle, at the end of the beam) will perform the operation of horse-hoeing between the rows of corn, or other plants; and will be more agreeable to the ploughman, because he is accustomed to use them.

Whether the profit of a new impression of the whole would answer the expence, I must leave to the consideration of those who are the best judges of it. If they do not think it adviseable to give one good edition of the whole, I hope they will find their account in reprinting the additional parts. To suffer them to be lost, or forgotten.

gotten, would be a real injury to the public, and to every lover of agriculture in particular, whether he is, or is not, a driller and hoer; for I may venture to affirm, that there is not one author of any note, that I have seen, who has written upon agriculture since Mr Tull published his Specimen and Essay, but who has, in part or in whole, adopted his theory, or borrowed from him some of the most material of the modern improvements.

As it may be some time before the last parts of his work are re-published, I shall, for the benefit of such of your readers as incline to practise the new husbandry, take notice of one or two important alterations in the horse-hoeing culture.

In the Essay, Mr Tull directs, that the hoe-plough should be brought as near as possible to the rows at first, and when the plants are young; but that the subsequent hoeings should be at some distance from the rows, lest the plough should tear off too many of the roots, and destroy the plants; also that the last hoeing should throw the earth of the intervals up to the plants, which he thought necessary for their better nourishment, when they were grown large. His last practice was different in both these respects.

For in the Conclusion, page 272. he says, “ At the
 “ second hoeing, the plough goes in the furrow of the
 “ first, making it deeper and nearer to the wheat: the
 “ third hoeing fills up this furrow; and then, at the
 “ fourth hoeing, the plough goes in the same place as the
 “ second, turning the mould into the intervals. ’Tis re-
 “ markable, that though the furrows of the second and
 “ fourth hoeings be deep and near to the rows, seeming to
 “ deprive the wheat of the mould which should nourish it,
 “ whereby one would imagine, that these furrows, lying
 “ long open, should weaken or starve it; but it is just
 “ the contrary, for it grows the more vigorous: and it is
 “ the observation of my ploughmen, that they cannot,
 “ at these hoeings, go too near to the rows, unless the
 “ plough should tear out the plants.”

“ If

“ If I may presume to assign the cause of this surprizing
 “ effect, it is in my opinion the following, *viz.* this open
 “ furrow has a double surface of earth, which, by the nitre
 “ of the contiguous atmosphere, is pulverized to a great
 “ degree of minuteness near the row. The roots that the
 “ plough cuts off on the perpendicular side of the furrow,
 “ send out new fibres to receive the pabulum from this
 “ new-made pasture; and also part of this superfine powder
 “ is continually falling down into the bottom of the furrow;
 “ and there gives a very quick growth to those roots that
 “ are next it, and a quick passage through it into the earth of
 “ the interval, where they take likewise the benefit of the
 “ other side of this pulverized furrow. When it is said
 “ that air kills roots, it must not be understood that it kills
 “ a plant, unless all, or almost all, its root is exposed to
 “ it, as it is not in this case. Some think there are roots
 “ that run horizontally below the plough into the interval;
 “ but of this I am not convinced.”

“ ’Tis not often that we plough above four times, and
 “ then the furrow is turned towards the row at the third
 “ time only.

“ Whether these furrows lying long open next the rows,
 “ in very hot dry climates, may be prejudicial, cannot
 “ be known but by trials.”

The practical hoer will find this method of going close
 to the rows of wheat, and other plants, of great service
 to him; not only in the vigour of his plants, but also in
 the more perfect tillage of his land, and a considerable sa-
 ving in hand-hoeing, weeding, and manure.

The other circumstance of a large plant growing more
 vigorous, and the seed sowing better, by ploughing the
 earth away from one side of it, is so singular, and opposite
 to the common practice of gardeners, that should it suc-
 ceed generally, it may lead to something new in the theo-
 ry of vegetation.

I cannot conclude without taking notice of a very cu-
 rious and valuable performance, just published, entitled,
 Essays on Husbandry. The author is a practical cultivator

of many plants and grasses, particularly lucern, in the way of transplanting and horse-hoeing. He is an advocate for the new husbandry in cultivating many sorts of vegetables; but disapproves of it for corn, of which he does not seem to have had experience himself. His two chief objections are, that he is not satisfied that the profit of raising corn is greater in the new husbandry than in the old; and that the new culture is too nice and difficult for common farmers. The last objection will be readily admitted to have great weight; but it will conclude, almost equally, against the new culture of other plants, which he strongly recommends: but if gentlemen will set the example, and give proper encouragement to the farmers, time and perseverance will overcome many difficulties: but till the farmers are convinced, that the new husbandry will be the most profitable to them, it is not to be supposed, nor is it reasonable to expect, that they will ever attempt it; and therefore it is greatly to be wished, that such of your readers, as are furnished with experiments and observations of the new husbandry, would communicate them to the public; and particularly that your ingenious correspondent in Ireland, who has testified his approbation of it by his letters, and his extensive practice of it in the fields, would oblige your readers with a particular account of his expences, and produce, *per* English acre, of his lands cultivated in this manner, especially of his wheat-crops; together with the usual expence and produce of the common wheat-crops in Ireland, in his neighbourhood.

As I have some grounds to believe, that the horse-hoeing of wheat (and the new husbandry in a larger sense, for barley and other corn) is superior, in several respects, to the common husbandry, and also more profitable, I shall be glad to see a fair state of the whole, on both sides; to which if I can, in any degree, contribute, it will be very agreeable to,

GENTLEMEN,

Middlesex,
September 22. 1764.

Your very humble servant,

F. S.

DRILL and HORSE-HOEING HUSBANDRY.

MUSEUM RUSTICUM, Dec. 1764. No. 78.

The Advantages of Tillage superior to those arising from Dung, illustrated by an Account of a Series of Experiments made on the same Field, for twenty-two or twenty-three Years, in which Space of Time nineteen or twenty Crops of Wheat have been got, by practising Mr Tull's Method of Husbandry,

GENTLEMEN,

ONE of your correspondents proposes some queries relating to manures and tillage, and quotes the author of a small publication in 1762, who, he says, with seeming propriety ridicules the notion of our modern improvers, that tillage is superior to manure. The ingenious author of the late Essays on Husbandry is also of opinion, that manure is necessary for corn in the best soils, and that all arable lands ought to be fallowed every third year.

That manures are sometimes necessary, and in many cases very beneficial, is certainly true; and where they can be had at a less expence than the necessary additional tillage, it may be the farmer's interest to use them: but, in many places, tillage is cheaper than manure; and to magnify the advantages of manure for corn, is more prejudicial to farmers so situated, than persuading them to a better tillage of their lands: for the point to be considered is not, whether manures or tillage produce the largest crops, but which of them is, upon the whole, the most profitable husbandry.

It is observable, that those who insist upon the necessity of manure and fallowing for corn, found their arguments upon
the

the practice of common husbandry, in which it is not denied that they are necessary; but this necessity, even in that husbandry, arises, in a great measure, from a circumstance which they do not usually take notice of, *viz.* over-cropping.

This is unavoidable in the common husbandry, where manures, and particularly dung, are substituted in the room of tillage; for if the land is sown thick with corn to keep down the weeds, or if sown thin, and the weeds grow, in both cases it is filled with, at least, triple the number of plants necessary to produce a crop. The same happens the second, and every year it is sown with corn. This is a known fact; it is universal, and cannot be prevented in this husbandry. The consequence is evident; the land is exhausted by a great number of unnecessary plants, and gets out of tilth, because it cannot be hoed; and hence the necessity of manure and fallowing.

But the author of the *Essays on Husbandry* supposes, that manure is necessary even for horse-hoed crops of corn, and the best land; and in support of this opinion, he has mentioned a fact, which it is necessary to take notice of particularly, as it is an important one.

"I am well informed," says he, page 217. "since M. du Hamel published his last work, in 1761, that M. de Chateauxvieux found, by experience, that in spite of all assistances from ploughing, without using manures, he carried a visionary idea of Mr Tull's too far. Of course he returned to the old practice, combining one and the other, as before recommended; and, as his fields had been thoroughly pulverized, and cleansed from weeds, every spoonful of manure took effect, and the produce of corn was very surprising."

An account has been published of this gentleman's experiments, to the year 1756, at which time he had raised, upon some of his lands, five successive hoed crops of wheat without manure: and it appears here, that he continued these crops in the same manner for five or six years longer. If he found it then necessary to use manure, the

the cause must be some difference in the tillage, or largeness of the crops, and not, as our author supposes, an imaginary idea of Tull's; because we have shewn in a former letter, (see page 251.) that Mr Tull himself continued his wheat crops for twelve years with success, and the twelfth crop was the best.

M. de Chateaufvieux had not seen the last-published works of Mr Tull, which contain several improvements in the hoeing culture; and being very curious in agriculture, he did not confine himself to a bare imitation; but, as our author admits, he tried various methods of hoeing his wheat, and in one respect, like other husbandmen, was still endeavouring to obtain greater crops: but so far we are certain, from his own account of his experiments, that his crops, raised nearest to Mr Tull's method, were still improving to the year 1756; and he then declared himself fully convinced of the truth of the principles of the new husbandry.

There is no forming any certain judgment why this gentleman made use of manure at last, unless we had a detail of his experiments for the last five or six years. But, as our author takes notice, page 26. that he, "being
" called of late to discharge his civil office in the republic,
" has not been able to oblige us with a continued series
" of his observations;" this, very probably, might be one reason of his adding manure, as he was sensible that his agriculture, in a new method, would not be carried on with that accuracy and success in his absence as under his own eye.

Our author seems to ground his opinion of the necessity of manure for horse-hoed corn upon this alteration in M. de Chateaufvieux's practice; and probably many other persons may do the same, and be deterred from attempting a method of culture that is supposed to have failed, though under the direction of this most accurate and justly celebrated husbandman.

In order therefore to shew, that the alteration in this gentleman's practice was not from any error in the principles

ciples of the new husbandry, I shall here produce an instance of horse-hoed wheat-crops, continued without manure much longer than any hitherto mentioned.

These crops have been raised by a gentleman in Berkshire, who was acquainted with Mr Tull. He has cultivated one field in this manner, about twenty-two or twenty-three years, and still continues to do so. In that time he has received from this field nineteen or twenty crops of wheat. One year it was fallowed, and two more was sown with peas and tares.

The reason of discontinuing the wheat-crops in these years (which happened at different periods) was, that the soil of this field is of a very stiff, obstinate, binding quality, not the most proper for wheat, or the hoeing culture, otherwise than in respect to situation: and as it is very difficult to keep it in good tilth, if the critical seasons of hoeing it are missed, this happened to be the case in these years, and the owner then omitted to drill it with wheat, that he might bring it into better order for the next crop.

One part of this field has been several times dunged, and the other has had no dung, or other manure, during these twenty-three years. In all other respects, the whole has been cultivated in the same manner. Two rows of wheat, about ten inches apart, are drilled upon each ridge. The ridges are about the same breadth, and the horse-hoings the same, as last directed by Mr Tull. The usual quantity of seed is about three pecks to an acre of the white cone-wheat, with some mixture of red Lammas.

The crops have been various, as may be supposed, in a course of twenty-three years. In general, they have been nearly equal to the neighbouring sown crops, in the respective years, and in land of the same sort; from two to about four quarters *per* acre, nine-gallon measure; besides a saving of about two bushels of seed.

In 1763, the summer was uncommonly wet, and very unfavourable for horse-hoeing, especially of this sort of land.

land. A trial was made of an acre of that crop, threshed by itself, which produced twenty-two bushels of clean wheat.

The effect of the dung laid upon part of this field, has been scarcely discernible in the crop; and a person who did not know where the dung was laid, could hardly distinguish it at harvest. This is very different from the effect of M. de Chateauxvieux's dressings: probably the difference might be from a different condition of the land and the manure. His land was finely pulverised by much plowing and hoeing; and his manure seems to have been applied by way of a top-dressing, which is often more beneficial to corn than dung laid on in autumn. The soil of this field, being very stiff and binding, requires more tillage to pulverise it than lighter land: but the few hoeings given it are not sufficient to keep it in that perfect tilth that his lands seem to have been brought to.

The reason of this different culture is the different method of planting the wheat. When Mr Tull planted three rows upon a ridge, he found six horse-hoeings necessary; but when only two rows were planted, he hoed but four times. This is the usual number of hoeings given to this field, and are, as we have seen, enough to support these repeated crops. If the intervals were much more hoed, the corn would grow too rank, and lodge: for so far are these crops from exhausting good land, as is commonly supposed, that, in fact, the main difficulty in managing these crops in such land is, to prevent their growing too luxuriant. It was for this reason that Mr Tull, as he tells us, added a middle row, as an alloy to the other two, to prevent their growing too rank: and when he altered this, and planted only two rows, he abridged the number of hoeings from six to four.

The superior effect of tillage is here very evident; and this experiment is, I think, a full answer to the query made by your correspondent; for no assistance of dung will make ordinary land produce repeated crops of wheat with the common tillage.

There

There is another very material advantage, which, I believe, may be derived from this circumstance of abating the number of hoeings, which would require too much room to explain it fully ; but, in the mean time, I could not omit making this remarkable experiment known, when I found that an alteration in M. de Chateauvieux's practice was urged so strongly against this principle of the new husbandry, especially as the principle, though supported by arguments which seem to be very plain and conclusive, requires a long course of experiments to prove it from facts and real practice.

As I write this without the knowledge of the gentleman who has made the experiment, I do not think myself at liberty to mention his name ; but if any gentleman, curious in agriculture, is desirous of more particular information, he shall be fully satisfied of the truth of what is here related.

Though the repetition of wheat-crops may, in some cases, be only a matter of curiosity, yet, in many others, it will appear in a different light. Nor is this method limited to wheat, but may be very profitably extended to other plants, not commonly thought of ; for the benefits of the new husbandry, in this and other respects, are at yet but imperfectly known.

Many of your readers will probably think that the crops of this experiment were very small and inconsiderable ; and they will hardly be persuaded to believe them very profitable. I intend to give some information in this matter to such of them as may be unacquainted with the new husbandry ; and in this I hope to be joined and assisted by your practical readers, particularly by your friend in Ireland, being of opinion with him, that it is the best and most profitable husbandry, and therefore wish to see it more generally practised.

I am, GENTLEMEN,

Your very humble servant,

Middlesex,
Nov. 15. 1764.

E. S.

DRILL

DRILL and HORSEHOEING HUSBANDRY.

MUSEUM RUSTICUM, Mar. 1765, No. 49.

An Examination of some Points in a famous Calculation in favour of the New Husbandry; Queries about the Quantity of Straw in both Methods; Reflections on the Expence and Complexity of Drill-Ploughs; and on the Notion, that Dew is an Advantage to Wheat when cut.

GENTLEMEN,

IT is not only my profession, but my practice, in all disquisitions, to attend impartially to the evidence on both sides of the question. That concerning the preference of the old or new husbandry is of the utmost importance to the nation, and therefore certainly ought to be attended to with the utmost exactness and impartiality.

I confess myself, after a full examination of all that has been said in comparison of the two methods, to incline to prefer the new, where it can be practised with any tolerable convenience, as to its requisites, *viz.* proper instruments and dextrous men.

Yet I would have nothing advanced, even in favour of the side I prefer, which will not bear examination; and as I apprehend two points to have been advanced in the famous calculations of M. de Chateaucieux (as inserted by Mr Mills in his Complete System of Practical Husbandry) to evince the preference of the new husbandry to the old, which, I think, will not prove that preference, at least with us Englishmen; I esteem it my duty to lay my apprehensions on this subject before the public.

I. "In the common husbandry of this country [the

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"neighbourhood

“neighbourhood of Geneva] the farmer,” says *Monf. de Chateaufieux*, “can have but one crop in that time, [two “years] being obliged to sow his land only every second “year; and that one crop will fall greatly short of the “two which the new husbandry will produce.—A vast “advantage in favour of this last!” (See *Mills*, Vol. I. pages 129. 130.) We have the same point in calculation advanced by him again (in page 140.)

Now, by whatever circumstances of peculiarity the people about Geneva are obliged to have only one crop in two years, these ought to have no weight with us Englishmen in determining the preference due to the new husbandry; for, in the common course of our old husbandry, we have two crops in three years, or three crops in four years; and though we have not two wheat-crops in immediate succession, yet our crops of beans, peas, barley, and oats, are obtained with so small expence of cultivation after our wheat-crops, that no one seems to doubt but the clear profit is greater; and many, who raise wheat under great disadvantages, are content to have the succeeding crops, or even crop, of worse corn for their profit for the whole culture. Three, or even two, crops then with a fallow, as is usual with us, must not be considered as only equivalent to one crop with a fallow, which the neighbours of Geneva have.

But I am obliged by impartiality to remark further, that even our old husbandry is now so much improved, as not to leave us under the necessity of having any year without a crop.

It is well known, that many farmers, with great success, sow clover with their barley, and, in the summer which succeeds the reaping of that barley-crop, take one crop, if not two, of the clover, and then plough it in and sow wheat. Others sow turneps, then barley with clover, then reap the clover and sow wheat.

Experience of other neighbouring countries, and even our own, now shews us, that we may sow carrots, and several other roots, and then pursue, with success, the same

same routine, or course, as though we sowed turneps; and Mr Mills has assured us on * good credit, that a crop of parsneps, is esteemed of equal value with three crops of wheat, of four quarters to the acre!

II. "It may, perhaps, be thought odd," says Mons. de Chateauvieux, "that I should limit the produce of the field, sowed in the common way, to three times the seed. I know there are lands in this country which yield more, *viz.* four or five times the seed, and sometimes upwards: but then it must be granted, that there are but few such lands, and that they are fields in extraordinary fine tilth, and enriched with manure. I therefore speak of our lands in general, taking good and bad together. In this case, I say, the produce, one year with another, will not exceed three for one." (See Mills, Vol. I. p. 140.) He adds, that his "fields have always been as well cultivated as any in the country;" and that from careful accounts it appears, that in the course of sixteen years they have not produced more on an average.

Now, gentlemen, if the poorness of these crops about Geneva be not the effect of want of culture in the old way, every new method, which will assist the poorness of the soil, is of great consequence to that people; and yet ought not we Englishmen to make this point of calculation, *viz.* the ground's giving only three for one, that is, two thirds produce beyond the seed, a ground of preference of the new husbandry.

Mr Miller on this subject says, "In some shallow, chalky, down lands, where near four bushels of corn have been sown, I have known the produce not more than double the seed." (See his Gardener's Dictionary, art. Triticum). But this is not to be ascribed to any essential defect in the method of the old husbandry, but either wholly to the badness of the soil, or chiefly so, and, for the rest, to the bad practice of the old husbandry; for the

* See Observations de la Société de Bretagne pour les années 1757 & 1758, page 90.

the same gentleman adds, that he has known, on good ground, thin sown in the common way, above ten quarters on an acre. (See *ibid*). Now, if the corn on this good land stood thin, we may safely conclude, that it was sown thin; so that probably not above three bushels, if so much, were sown; and then the produce will be to the seed as twenty-seven to one, or nearly; and Mr Miller justly mentions twelve quarters as a great crop in the best management of the new husbandry. (See *ibid*.) The question then is, whether this additional quantity pays for the additional expence, trouble, &c. in the new husbandry? which it probably does very well in circumstances where proper instruments can conveniently be had, yet not so as to leave the difference of the nett profit of the two methods any thing like what it has been represented under the circumstances above examined.

III. Another point which seems to me of great consequence to be inquired into, is, Whether the quantities of straw produced by the new husbandry be as much superior to those produced by the old, as the quantities of corn are supposed to be?

I propose not this query to discountenance the new husbandry, to a preference of which, on the whole, I incline; but that so interesting a fact may be determined. I call it interesting, because the straw of a good crop of wheat is in any year of great value, and in some years (such as 1762) of prodigious value, towards supplying the deficiency of hay.

From the account which M. de Chateaufieux gives of the stubble of his wheat, it would seem that what may be wanting in the number of stalks, if there be any want, is amply made up in the strength, bulk, and weight of the straw in the new method; and I should not be surprised if it appeared that the real quantity of straw is greater in the new than the old husbandry; for the corn must be fed by the straw, and therefore one would conclude that where there is a superiority of corn, there must be

be a superiority of straw, as to real quantity, though not as to length.

But, on the other hand, since we know, that bad crops frequently run to straw, insomuch that there will be many stalks, nay tufts, with little or no corn, this point seems not so clear as one could wish; and though a loss in corn is not easily made up in straw, yet I think it very probable that the straw of a bad crop of corn may out-weigh the straw of a good one; and it will be an useful as well as entertaining employment to ascertain this fact.

IV. What seems to me the greatest and almost only considerable objection to the new husbandry, is the great expence of forming, and keeping in order, an hoe and drill-plough. M. de Chateauvieux has told us, that he thought Mr Tull's too complex. (See page 131. of Mills, Vol. I.) But will not any impartial inquirer say this of Mons. de Chateauvieux's? I fear he will, when he sees that Mr Mills was obliged to employ no less than eighty pages in describing it. We have another advertised; but, as I have neither seen the model nor its description, I can only say, that I wish it may be so much more simple and cheap as to encourage the giving a fair trial to the new husbandry.

And here I must again lament, that the society for encouragement of arts, &c. have flinted the time for composing accounts of the best methods of cultivating wheat, &c. to so short a period. It is to be hoped, that they will extend that time, in order that they may receive accounts worthy of the premium, honourable to the society, and most highly useful to the public.

V. The writers in favour of the new husbandry have, very judiciously, begun their collections by experiments, to shew that the sowing with the drill at equal distances, without alleys, gives better crops than sowing by the hand in broad-cast; and then they bring very naturally other experiments to shew, that sowing with alleys, so as to horse-hoe, gives much better crops than sowing without them. If any body then can shew, that sowing with the drill is a worse method than sowing with the hand, he overthrows

overthrows the credit of the new husbandry; and that it is a worse method, seems to be the opinion of one of your correspondents, unless by drill-husbandry he means the horse-hoeing husbandry in its full extent, as is sometimes meant, and then his censure of the new husbandry is full and direct. His words are, "Drillers (I was formerly "one)"—and seem to me evidently to contain a * condemnation of the drill-husbandry: and Rusticus will oblige the public much, if he will assign his reasons for giving over this practice; for converts from any opinion are always heard with most attention, and their arguments have generally most weight.

VI. A late author of a new and complete Body of Husbandry has observed, that dew plumps wheat when cutten. But does dew improve it? I think clearly otherwise. The purpose of corn standing in the field when cut, is to dry and harden it; and it generally wants some field-room, unless the owner is injudicious enough not to cut it till full ripe, when it must waste greatly.

Dews are certain concomitants of the best weather in the wheat-harvest, at least with us in the north; and, no doubt, as the skin of wheat is tender, especially while in the field, the dews do penetrate and plump it, and make it appear better to the view when threshed and on sale in the market, and fill the bushel better, consequently bring more to the farmer: but, according to all my philological notions, the dew must retard the very design of giving of field-room,

* The purport of the whole passage from whence these words are taken, is only to condemn the drillers for rejecting the use of manure on moderate land, especially for turneps. But the parenthesis seems a condemnation of the whole practice of drilling, though only an incidental condemnation. Rusticus would not have given up the whole practice of drilling, because drillers usually decry manure, but would have added manure to drilling, had he not espied essential defects in the method, in his opinion. COMB.

field-room, if not absolutely disappoint it; and for any one's use the wheat is really of so much less value as it has imbibed more dew; consequently, any man who houses wheat for his own use, will let it have as little dew as he can.

The author of this opinion which I am controverting, Mr Mills, (see page 396. &c. vol. I.) owns, that these dews are only necessary in cold summers; for the grain's own vigour will plump it sufficiently in hot ones. He says, that in the former the husks cling so close, that they must be plumped by dews in order to make them thresh well. But it seems very bad oeconomy to make corn, already too moist and cold, still moister and colder, in order to thresh somewhat better; that is, to spoil the meal to save a little labour. He owns also, (page 399.), that even in the middle of August, the dewy nights grow so long, that the corn is in much more danger of growing in the sheaf, and the straw of being tendered and damaged, especially for fodder. (See page 306.)

I am, GENTLEMEN,

Your faithful and impartial correspondent,

East-Newton,

THO. COMBER, jun.

Aug. 23. 1764.

P. S. If I have leisure, gentlemen, I shall probably examine the account of the drill-plough invented lately in York, and communicate to you my reflections thereon, if you desire them. One thing I observe in regard to the newly-advertised plough, viz. that it is fitted to all kinds of soil; whereas M. de Chateauvieux seems to confess, that there are several to which his plough is not fitted; so that other instruments must be sought out. (See page 101. of Mills first Volume.)—N.B. He excludes both stoney and clayey soils from the use of his plough, though the latter is most proper for wheat.

DRILL

DRILL and HORSE-HOEING HUSBANDRY.

MUSEUM RUSTICUM, Aug. 1764. No 12.

Experiments ascertaining the comparative Weight of the Grains, Chaff, and Straw, of a Crop of Wheat; with some valuable Hints towards attaining heavier Crops; concluding with a Recommendation of the new Husbandry.

GENTLEMEN,

ONE of your correspondents gives some curious experiments for finding the mean weight of wheat, in order, as he says, to prevent the farmers from enhancing the price of it. These experiments were begun in the year 1757, when wheat was at an excessive high price; and the design of this gentleman, to prevent, or defeat, the practice of engrossing it, is highly commendable.

But as it is necessary that wheat, in plentiful years, should be stocked somewhere for a supply when the crops fall short, it is better for the poor to have it at first hand than of other dealers in corn, loaded, as it must then be, with large additional expences. If we had public store-houses for corn, it might be kept to a more equal price, and the farmers would have a market for it when cheap: but while there is no such provision, it may be a question, whether it would be good policy to lay restrictions upon the raisers of corn, as that might discourage agriculture, and create a real scarcity.

The experiments made by your ingenious correspondent are very accurate, though, in my opinion, much too small to determine matters of such importance: but he has, I think, fallen into a mistake that I also did in trying some experiments

experiments upon wheat, *viz.* in supposing that a middling ear is a standard for computing the crop. This, indeed, would be the right rule, provided there was a regular gradation in the ears above and below the middle size: but, in fact, it is otherwise; there are generally more small ears than large ones, and yet the corn in the large ears may weigh most.

To explain this, let us suppose a person going to chuse some middling ears as they stand in the field: he must do this either guessing by his eye, or by measuring some of the different sizes, and taking those of the middle size as near as he can. The sizes can only be determined by their length and fullness: and if, for example, the longest are five inches, and the shortest one, the medium is three inches. Now, though those of three inches are undoubtedly the middle size, yet, unless the weight and measure of the corn in the ears below three inches are equal to that of the ears above that size, the calculation of the crop from the three-inch ears will be wrong. This will be seen in the following tables.

I once took an account of great part of a sheaf of red Lammas wheat; but having mislaid my notes of it, I shall at present take notice chiefly of an experiment made upon white Lammas wheat, of the crop 1762. The ears and straw of this crop were in general very short; but the corn was remarkably fine, full, and heavy. The wheat of this experiment was raised upon clover lay, and the crop about twenty bushels upon an acre. A nine-gallon bushel of this wheat weighed above seventy pounds avoirdupoise, which is usually reckoned the full weight of good wheat, though some will weigh more, as the best generally did that year.

In February, 1763, I took some of this corn out of a middling sheaf, and, as near as I could, of the middle-sized corn: but it was taken out all together, and, without separating of it. I sorted what was thus taken out, into four parcels, nearly according to the length of the straw,

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in order to discover the proportion between the ears and straw of different lengths ; but there seems to be little certainty in this.

These four parcels were weighed separately, ears and straw together ; then the ears by themselves ; and, last of all, the corn when separated from the chaff.

I weighed twenty of the first parcel by themselves, that had the longest straw, and longest fullest years ; and afterwards weighed them singly, taking the weight and measure of each as in the table.

Being desirous to know the weight and produce of the ears of different lengths, I sorted each parcel according to the length of the ears, differing one from another about half an inch ; and I weighed these subdivisions separately, noting the length of the ears, and the number of chests and grains in each. The length of the ears was measured from the bottom of the lowest chest that had any corn in it, to the top of the ear. The longest ear was three inches and a half, but there being only one of that length, it is included among those of three inches and a quarter. The twenty ears first weighed are included in the sixty-three large ears in this last weighing.

Several ears have some very small grains in them : these are set down in the table, but not reckoned in the weight, because I supposed them not marketable, and that they would go to the tailing, or off fall corn. Of these small grains two thousand one hundred and eighty-seven weighed an ounce averdupoise. The rest were weighed by troy weight, as below.

The Weight of the four Parcels.

		oz.	dw.	gr.
250 of the longest	(the straw 28 to 36 Inch.)	18	18	4
500 of the second size	24 to 32	26	17	16
250 of the third	20 to 26	11	7	20
250 of the fourth	16 to 22	5	4	18
1250 ears with the straw		62	8	10
		<i>Twenty,</i>		

*Twenty, with the longest Straw, and longest fullest Ears,
weighed singly,*

	Inches.	Chests.	Gr.		oz.	dw.	gr.
1 ear	3 $\frac{1}{2}$	20	40	The corn in these } twenty ears wd }	1	2	12
1 do.	3 $\frac{1}{4}$	18	41				
1 do.	3 $\frac{1}{4}$	17	39				
1 do.	3 $\frac{1}{4}$	17	35				
1 do.	3	16	34	The chaff — —	0	5	15
1 do.	3	17	35				
1 do.	3	17	34	The straw — —	1	0	21
3 do. each 3	17	101					
10 do. each 2 $\frac{3}{4}$	15 to	17	325	The ears and straw 2 9 0			

20 ears

333 684 = 34. 2 grains in each ear upon a
medium.

In the first of the following tables are inserted the assortments of the four parcels, by the length of the ears, with the number of chests and grains in each, and the separate weight of the ears, grain, and chaff. I must observe, that by accident I missed taking the distinct weight of the two hundred and fifty smallest ears: they are set down in the table as I computed them, in proportion to the third, or preceding parcel, which may differ a little from the real weight; but this cannot be much, for the weight of the whole parcel is right.

In the second table, the length, weight, &c. of the twenty largest ears, are set down in the first line: in the second line are the sixty-three large ears, including these twenty: and the third line contains the two hundred and eighty-eight smallest ears. They are set thus together to give the more easy comparative view of them. The next three lines of this table shew the weight, &c. of all the middle-sized ears, and of all those above and below the middle size, brought thus together also by way of comparison. To these I have added, in the following columns, a calculation of the number of chests in each assortment of ears, and the mean number of grains in each chest; also, the number of grains, and weight of a mean ear, of each assortment.

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The last table shews the total weight of the corn, chaff, and straw, upon an acre, agreeable to this experiment, reckoning the crop at twenty bushels of nine gallons, or seventy pounds, averdupoise, *per* bushel.

The very small grains are not reckoned here, for the above reasons; and that the waste in reaping, carrying, threshing, and some left in the straw, is more than they amount to. But by adding them, and allowing for about seven or eight inches long of stubble, the total weight of the crop may be nearly estimated.

A Table of the Length, Weight, &c. of One Thousand Two

Ears. No.	Length Inches.	Chests. No.	Grains Gr. Sm. do.	Wt. of Ears. Oz. Dw. Gr.
20	$3\frac{3}{4}$ to $3\frac{1}{4}$	15 to 20	684	1 8 3
7	$3\frac{1}{4}$	16 18	215 11	0 8 3
11	$2\frac{3}{4}$	15 16	300 11	0 11 21
80	$2\frac{1}{4}$	14 15	1930 60	3 13 10
85	2	11 14	1600 110	2 18 18
47	$1\frac{3}{4}$	9 12	738 31	1 5 8
250			5467 223	10 5 15
8	3	17 18	265 4	0 10 12
17	$2\frac{3}{4}$	14 16	443 29	0 17 9
108	$2\frac{1}{4}$	14 15	2405 70	4 4 9
164	2	11 14	2925 145	5 2 14
203	$1\frac{3}{4}$	9 11	2727 121	4 10 0
500			8765 369	15 4 20
40	$2\frac{1}{4}$ to $2\frac{1}{2}$	13 16	827 50	1 10 12
65	2	10 13	1075 70	1 15 15
107	$1\frac{1}{2}$	8 10	1350 45	2 1 13
38	1	6 7	293 5	0 8 19
250			3545 170	5 16 11
250	$\frac{3}{4}$ $3\frac{1}{4}$		1622 78	2 13 13
1250			19399 840	34 0 11

and Two Hundred and fifty Ears, sorted according to their Length.

Wt. of Eats. Oz. Dw. Gr.	Wt. of the Grain. Oz. Dw. Gr.	Wt. of Chaff. Oz. Dw. Gr.	Wt. of Straw. Oz. Dw. Gr.	Total Weight. Oz. Dw. Gr.
8 3	1 2 12	0 5 15	1 0 21	2 29 0
8 3	0 6 9	0 1 18	} 7 11 16	
11 21	0 9 5	0 2 16		
13 10	2 17 13	0 15 21		
18 18	2 5 6	0 13 12		
5 8	0 19 18	0 5 14		16 9 4
5 15	8 0 15	2 5 0	8 12 13	18 18 4
10 12	0 8 8	0 2 4		
17 9	0 13 4	0 4 5		
4 9	3 8 13	0 15 20		
2 14	4 0 0	1 2 14		
10 0	3 10 0	1 0 0		
4 20	12 0 1	3 4 19	11 12 20	26 17 16
10 12	1 3 13	0 7 0		
15 15	1 7 14	0 8 0		
1 13	1 12 17	0 8 20		
8 19	0 6 19	0 2 0		
16 11	4 10 15	1 5 20	5 11 9	11 7 20
13 13	2 1 16	0 11 21	2 11 5	5 4 18
0 11	26 12 23	7 7 12	28 7 23	62 8 10

A comparative View of the above One Thousand

	Ears. No.	Length, Inches.	Grains. No.	Wt. of Oz. D.
Largest — —	20	$2\frac{3}{4}$ to $3\frac{1}{4}$	684	1
Large — —	63	$2\frac{3}{4}$ $3\frac{1}{4}$	1907	2 1
Smallest — —	288	$0\frac{3}{4}$ $1\frac{1}{2}$	1914	2
Large — —	291	$2\frac{1}{4}$ $3\frac{1}{4}$	7069	10
Medium — —	314	0 2	5600	7 1
Small — —	645	$0\frac{3}{4}$ $1\frac{3}{4}$	6729	8 1
Total — —	1250	$0\frac{3}{4}$ $3\frac{1}{4}$	19399	26 1

*Total Weight of the Crop upon an Acre, agreeable
Bushels of nine Gallons, or*

Wheat.			Chaff.		
C.	q.	lb.	C.	q.	lb.
12	2	0	3	1	23

Small

Thousand Two Hundred and Fifty Ears of Wheat.

Wt. of Grains. Oz. Dw. Gr.	Chests. No.	Grains per Chest	Grains in a mean Ear.	Weight of a mean Ear.
1 2 12	333	2.054	34.2	27.000 Grains
2 19 14	1012	1.884	30.269	22.696 Troy.
2 8 10	2016	0.949	6.645	4.034
10 9 5	4318	1.637	24.292	17.288
7 12 20	3849	1.454	17.834	11.681
8 10 21	6199	1.085	10.432	6.358
26 12 23	14366	1.35	15.519	10.232

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*reeable to the above Specimen, reckoning the same at twenty
llons, or seventy Pounds per Bushel.*

Chaff.	Straw.	Total Produce.
q. lb.	C. q. lb.	C. q. lb.
1 23	13 1 7	29 1 2

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Small experiments are not so satisfactory as large ones ; and I could wish this had been more extensive ; but I had no thoughts of offering it to public view till I read your correspondent's letter, who has, I apprehend, gone upon a wrong rule in computing a crop, and has also chosen the mean ears too large : for, though the ears of red Lammas wheat are usually longer than the white, it cannot be supposed that, upon an average, they are above double, both in weight and number of grains, as we find those were to the mean ears of this experiment. Neither is it at all probable, that the mean ears of the common crops in any part of England, and in the same year, should be heavier, and contain more grains in them, than the very largest ears of this experiment.

The ears of this wheat being from three and a quarter to three quarters of an inch in length, the medium is two inches. I have ranged all these together in the second table. They are a fair medium in regard to length ; and they are so also as to fulness, because they are all included : but, as appears in the table, they are not so in respect to the weight of the grain, which is the rule for the medium of the crop ; for the small ears are more than double the number of the large ones, and yet the large ears are the heaviest. If, in order to make the number of ears equal, we chuse the mean ears shorter than two inches, the inequality of weight will be greater than before ; and if we take our medium higher than two inches, the weight may be made equal, but this will increase the disproportion in the number ; and hence I think it is evident, that we cannot fix upon any size of ears that will give us a just medium of the crop. The same will happen in other crops, for they all vary one from another in the size and number of ears : and, as we cannot be certain of their real proportion as they stand in the field, it is impracticable to calculate a crop from those of any size.

The calculation of a crop from a mean ear is made by multiplying the weight of grain in that ear by the number
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of ears upon an acre. A mean ear of this experiment weighed, as in the table, 10.232 grains troy, and the crop was about twenty bushels upon an acre. Your correspondent reckons the weight of a mean ear at 24.05 grains troy, upon an average of seven years; so that, reckoning the same number of ears upon an acre as in this experiment, his crops will amount annually to forty-seven bushels *per* acre, of seventy pounds averdupoise *per* bushel. These are such crops as, I suppose, no considerable extent of contiguous lands in England produce annually; and are, doubtless, more than double the common crops upon an average.

The disproportion in the number of small and large ears is very remarkable, and also their disproportion in size; for, if we calculate from the twenty largest, we shall find that forty-three of them weighed as much as all the two hundred and eighty-eight small ones, *viz.* one large ear produced as much corn as seven small ones, and the grain in them also larger, and consequently more flour in them: for one hundred of the large corns weighed seventy-eight grains troy, and one hundred of the small but sixty grains; so that four grains of the large ears were heavier than five of the small. This great difference is not from any defect in the rudiments of these small ears but is occasioned principally from bad culture, and a defective nourishment; because we see that the plants raised from the same seed, will have larger or smaller ears, according as they are cultivated. It might, however, be useful to know at what period of their growth those small ears are stunted, and whether they are produced from the original plant, or from the tillers. I am not furnished with experiments to determine these points, but recommend them to the inquiry of your readers.

It is certain that the ears of wheat, in general, do not arrive to the size that they are naturally capable of: and if it was known at what period they are formed, the stunting of them might, in some degree, be prevented by a dressing, or other culture, at that period. The

there is some such period in nature, may appear from other circumstances in the growth of this plant. There is a particular season for its tillering, or spreading; another for its upright growth; and one for its blossoming and forming the seed; and probably one also for the ear being formed: and the growth of it, in respect to each of these, may be promoted by culture, or retarded by a defect of nourishment at these periods.

When the season of tillering is past, no culture will make the plant throw out more branches; and after the ear is shot out, it is then impracticable to make it larger, viz. to increase the number of chests. Again, when it has blossomed, no art will cause the stem to rise higher. And, last of all, after the time of blossoming, there is no adding of one grain more than is already formed in the ear; though, in all these cases, an addition, or improvement, may be made by culture, if applied at the proper time.

It is therefore of importance to know the periods of growth of the different parts of the plant; and that if we happen to miss assisting of it in one, we may improve it in another. If the season is lost to increase the number of tillers, we may enlarge the ears; or, if that is also omitted, we may increase the number of grains in the ears, and make them larger, and fuller of flour.

To shew this more plainly, with respect to the grain, let us a little consider the structure of an ear of wheat. The grain is placed in a cell, consisting of two valves, or leaves; and there is one leaf extraordinary on each outside of the chests, which seems intended as a fence, or security, against accidents to the outward grains. The chests about the middle of the ear are the largest, and usually consist of four, five, and sometimes six or seven cells: and the number of cells decreases towards the top and bottom of the ear. If the ear is examined when in blossom, we may see what number of grains each chest is formed to produce: or this may be seen afterwards by the number of double valves, which are properly the chaff;

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for these remain, though the grains have proved abortive; and therefore, by counting the leaves of chaff, allowing two to each grain, and two extraordinary to each chest, we shall find what number of grains each chest might have produced,

The outward grains of the chests are commonly the largest, and smaller towards the middle, and often stunted grains, or none at all, in the middle cells; and this, notwithstanding most of these had blossoms in them, and the grains had made some progress, or begun forming. They are later than the outside-grains, as if last impregnated.

The number of these deficient, or missing grains, is greater than might be supposed without examining them. In a favourable season most of the cells have grains in them; and, if examined at the time of blossoming, the grains may be seen in different degrees of maturity, many of them with the naked eye, and others with a good glass; but though they appear then in general to be fresh, and in a growing state, a considerable number of them is afterwards stunted, or die away entirely. In an ear of red Lammas wheat, of six inches long, twenty-five chests, and two hundred and eighty-six leaves of chaff, I have counted seventy-four grains some time after blossoming; by which it appears, that this ear might have produced one hundred and eighteen grains; and yet at harvest I have not commonly found above sixty grains in an ear of that length. I have likewise this season counted fifty-four grains in an ear of white Lammas wheat, of three inches and a quarter long, nineteen chests, and one hundred and seventy-four leaves of chaff; so that this ear might have yielded sixty-eight grains: but we see in the above tables, that the fullest ear, of the same sort of wheat, and the same length, yielded only forty-one grains; and three of the same length yielded but thirty-eight grains and one third each, upon an average.

The tillage and dressing of land for wheat is done, for the most part, before the wheat is sown, and the benefit of these gradually decrease; whereas the wheat requires
a gradual

a gradual increase of nourishment, both in order to form large ears, and afterwards to fill them with large grain. And hence appears the great defect of the common husbandry, and points out the advantages of top-dressing wheat in the spring with soot, or other light manure, which bring the plants a fresh supply of nourishment when they want it most; and hoeing, when that can be performed at the proper times, particularly the deep, or horse-hoeing, has the same effect of producing large ears; and for filling them, the horse hoeing is the most effectual, as that can be performed at the critical time, and when the plants are large.

It has been commonly supposed, by those who practise the new husbandry, that the most important hoeing, for the purpose of filling the ears with good grain, is soon after the wheat has blossomed: but this, I believe, is a mistake, and that it should be performed immediately before the wheat blows; for before that is over, the grain is considerably advanced. I have found no less than seventy-seven grains in an ear of red Lammas wheat, of four inches and three quarters long, and at the same time a considerable part of the blossoms still remaining on the outside of the ear.

This is above one third more than usually comes to maturity in an ear of that length; so that it seems very probable the ears would produce near one third more corn than they commonly do, were they to be assisted at that time with sufficient nourishment. But this would come too late after the blossoming is over; for by that time, some of the weak grains die, and others are stunted, so as not to be recovered again by any future hoeings. A check at this critical time seems to have the same effect as it has upon a grain of corn, or other seed, after it has begun to vegetate: if that is put a stop to, it never recovers.

From the great number of small ears in a crop, and the deficient grains in all the ears, we may plainly see the advantage of good culture, and of taking the proper seasons to apply it. The new husbandry is, in this respect, much

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to be preferred; and also because much fewer plants will produce an equal crop; in which there are several advantages, besides saving above half the seed. This method of culture is, indeed, so much superior to the common husbandry, not only in raising wheat, but plants of almost every kind, that it is to be wished it was more promoted, particularly by the society for the encouragement of arts, by whose assistance, upon a right plan, there is great reason to expect success.

I am sensible that several gentlemen, and particularly some of your correspondents, have objections to this husbandry, arising partly from a misinformation of Mr Tull's practice and success, which may hereafter be more fully explained; and partly from the difficulty they apprehend in overcoming the prejudices of the farmers to any new methods.

That they are very tenacious of old customs, is readily admitted, nor are they to be too much blamed on that account: but that they cannot be prevailed with to alter them, upon rational evidence, and proper encouragement is, it is apprehended, carrying the argument too far, as this tends to discourage all attempts of improvement.

One of the reasons assigned, why the farmers cannot be brought to practise the new husbandry, is the difficulty of managing a drill-plough for sowing corn, which is admitted, though that is not so great as some have supposed; for I have seen a husbandman learn to manage such an instrument, who, after one day's practice, could sow with it four or five acres a day, with the proper quantity of seed, at a less expence than common sowing and harrowing. Mr Tull's drill-plough is, indeed, too complex: but probably one may shortly be offered to the public, that is easier to manage, and contrived to sow either upon the level, or upon ridges.

One of your correspondents has objected farther, that the farmers cannot practise this husbandry, because they are ignorant of its principles: but these principles are not many, nor hard to be understood, so far, at least, as re-
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lates to practice; and, in fact, the practice of the new husbandry is easier than the old, because it is founded upon clear principles, which often is not the case in the old husbandry.

It seems that several gentlemen are not for introducing this new method, because they are not convinced that it is, upon the whole, better than the old. If we may credit those who have gone furthest in the practice of the new husbandry, those gentlemen abroad in particular, who have published their experiments, there seems to be no doubt of its superiority: but as it is a matter of great importance, that this fact should be fully established to the satisfaction of all gentlemen, from whose influence and example the most valuable improvements are to be expected, the trial is not difficult, nor very expensive: a small farm, with some variety of soils in it, cultivated in the several methods, by way of comparison, and exact accounts kept of the expence and produce of each, would determine this point without any reasonable doubt.

In matters of this sort, speculations and reasonings are not to be relied on without experiments; and the larger they are, they will be the more convincing. Whether something, like what is here proposed, might not have the desired effect, and likewise be a means of making useful discoveries in vegetation, and the culture of plants, is submitted to the consideration of those who have at heart the improvement of agriculture.

A more extensive plan is necessary for introducing new methods into common practice, and which might comprehend the farmers, and also the husbandmen, who execute and excel in the performance. It is recommended to your readers to consider and propose what they think the most probable means for attaining these desirable ends.

I am sorry to find that some of your correspondents object to your explaining what may appear obscure in their letters, or giving reasons for differing from them in point of theory, or opinion. The gentlemen who make these observations appear very capable of throwing light upon the subjects

subjects offered to their consideration : I hope they will continue to do so, and promote the design of your undertaking by a free and candid inquiry.

I am, GENTLEMEN,

Middlesex,

Your very humble servant,

July 23. 1764.

E. S.

DRILL and HORSE-HOEING HUSBANDRY.

MUSEUM RUSTICUM, Feb. 1765, No. 19.

State of the Expence of a hoed crop of Wheat, and the profit of it compared with that of the common Husbandry.

GENTLEMEN,

I Propose in this letter to state the expence of a hoed wheat-crop. If this is done in any place where the price of labour is known, it will be easy from thence to calculate the expence of such crops in other places.

When wheat is to be horse-hoed, it is planted upon three-bout ridges, about four feet and eight or nine inches broad. If the soil is poor, they may be made broader, but should not be much narrower, otherwise there will not be room enough to plough the intervals. Two rows of wheat, about ten inches asunder, are drilled upon the top of each ridge, and then the intervals or spaces between the double rows will be about three feet and ten inches wide.

For the first crop the land should be well prepared, and very clean : it will therefore cost more than the following crops ; and if the land is not in good heart, the first crops will be the smallest, for hoeing greatly improves it. The following estimate is of the succeeding crops.

The necessary culture for these is, once ploughing in autumn, to form the new ridges for the next crop. This may

may be done with three horses; for the intervals, by frequent hoeing, are kept in fine tilth, and are ploughed at one bout; and the middle of the ridges where the last crop stood, being only the breadth of two narrow furrows, are easily ploughed at another bout; so that these ridges, which in common ploughing required three bouts with four horses, are now ploughed at two with three horses.

The intervals, after the corn is planted, are hoe-ploughed at one bout, to or from the rows. They are usually thus ploughed four times, once in the beginning of winter, and three times afterwards in the spring and summer.

The ten-inch partitions, or spaces, between the rows of wheat, are hand-hoed about the end of March: once is generally sufficient, because the wheat soon afterwards spreads, covers the partitions, and keeps down the weeds. The rows are also to be weeded. This is all the ploughing and hoeing that is commonly necessary till harvest. But as in some years it may be proper to plough the ridges in autumn at five or six furrows, or plough them twice, sometimes to hoe-plough the intervals more than four times, or to give them a trench-ploughing, where the staple is deep enough to admit of it, I shall make a full allowance for these, and charge two ploughings and six horse-hoeings every year.

The hiring price in some parts of Middlesex for ploughing a strong loam the first time, in the common way, is seven or eight shillings an acre; I shall say eight shillings. They work about eight hours, and plough about an acre a-day with four horses. The price of the labour may be thus distinguished: to the ploughman twenty-pence, and boy eight-pence a day, including their beer; and then the horses and harness, &c. will come to seventeen-pence a day each. Twice ploughing therefore in an autumn, with three horses, comes to eight shillings and nine-pence.

The tops of the ridges are to be rolled with a light roller, or harrowed once or twice with two very light harrows, to break the clods, and lay the tops of the ridges smooth for drilling. The harrows are fastened together

gether by a pole; and a horse, walking in the furrow, draws the two harrows, one upon each ridge. A rolling in the same manner is also useful in the spring, when the earth is pretty dry, and before the partitions are hand-hoed. These rollings and harrowings, of two ridges at once by one horse, are done at a small expence; and not being necessary every year, may cost about four pence: but to make the total an even sum, I shall charge for them (and uncovering the plants, if any clods happen to fall upon them at the first hoe-ploughing) seven-pence halfpenny per acre.

The usual quantity of seed is three pecks, and if it costs five shillings and six-pence per bushel, is four shillings and three half-pence per acre. The drilling is performed by a man and boy, and one horse. They may drill six acres a day: I shall say but five, which is nine-pence per acre.

The intervals should be kept in fine tilth: they are hoe-ploughed at one bout; three horses are sufficient for the first two hoeings, and two for the rest. I shall reckon three for each hoeing, and then six hoeings come to thirteen shillings and two-pence.

The price for hand-hoeing of beans the first time is about five shillings per acre; I shall call it six: and as the ten-inch partitions, and about two inches on each outside of the rows, is the whole to be hand-hoed, (for the hoe-plough does the rest), these are about one fourth part of the ridge, and should be done for eighteen-pence an acre: but it is a good way to agree with the hoers to cleanse the rows also of weeds; and as these ought to be well done, they expect something more than for common work, and they will cost near half a crown per acre.

For reaping, the prices are various; from five or six, to ten shillings per acre; at a medium, eight shillings is a high price. The drilled wheat, having scarcely any weeds in it, and standing upon only about a fourth part of the ridge, is easier and much quicker reaped than sown wheat, and not really worth above half the common price; but
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for the above reason, I shall allow, for reaping and carrying, six shillings per acre.

Wheat-straw is a valuable article in the neighbourhood of London; and the straw, chaff, &c. might be reckoned here to pay for threshing and carrying the corn to market: where it is otherwise, an allowance is to be made. And as the distance from the market is uncertain, I shall charge the carrying out, and at market, a shilling per quarter, besides the value of the straw.

Some estates are tythe-free; others pay in kind, or a modus. I shall reckon the tythe at four shillings per acre.

Suppose the rent is sixteen shillings per acre; there remain to be added the taxes or rates payable by the tenant, which, at two shillings in the pound-rent, come to nineteen-pence per acre.

I reckon nothing for dung or manure; for land that is proper for wheat, allowing sufficient intervals and hoeing, requires none. If the wheat of the first crops is weak in the spring, a top-dressing of the rows will be of service, or afterwards, if the proper hoeings have not been given the preceding year: but this seldom happens; for hoeing makes the plants strong, and if then also top-dressed, they would be in danger of lodging.

The whole expence, at these prices, of horse-hoed wheat, is, per acre, as follows:

	<i>l</i>	<i>s.</i>	<i>d.</i>
Two ploughings in autumn, with three horses,	0	8	9
Harrowing, seed, and drilling — —	0	5	6
Six hoe-ploughings of the intervals, with three horses — — — —	0	13	2
Hand-hoeing, weeding, and harvesting	0	8	6
Carried forward	1	15	11

	<i>l</i>	<i>s</i>	<i>d.</i>
Brought forward	1	15	11
Carrying out twenty bushels, and at market, (besides the value of the straw and chaff), ¹ at			
one shilling per quarter	—	—	0 2 6
Tythe, rent, and taxes	—	—	1 1 7
	3	0	0

This is the whole expence, supposing the soil to be a strong loam, the wages high, and the horses hired; but when done by the farmer's own horses, or the soil lighter, and they work more hours in a day, the expence will be a great deal less, as we shall see below: in some places it will not much exceed half this sum.

It has been already shewn, that one hundred acres of horse-hoed wheat, much of it a light, poor soil, produced near twenty bushels per acre; and that a strong soil, by a medium of twenty hoed crops, produced about twenty-four bushels per acre, both nine-gallon measure; and therefore we might reckon here a middling crop about twenty-four bushels: but to avoid all suspicion of partiality, I shall suppose that a good loam may, one year with another, produce only the least of these, or twenty bushels per acre.

The mean price of wheat at Windsor market, for the last twenty years, ending at Michaelmas, 1762, is nearly four shillings and eight pence three farthings per bushel, and twenty bushels, at this rate, come to four pounds fourteen shillings and seven pence; so the profit of the horse hoed wheat is one pound fourteen shillings and seven pence per acre, or above two rents.

One of your correspondents having stated the produce and expence of twenty acres of arable land for nine years, according to the course of husbandry practised in his neighbourhood, I shall, by way of comparison, calculate the profit
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of these twenty acres, supposing they had been under crops of hoed wheat during these nine years.

I reckon, from your correspondent's account, the wages of his ploughmen to be about fourteen-pence, and a boy four pence a day, (if not allowed beer), and the horses a shilling a day each, in all five shillings and sixpence, besides repairs: and if they work more than eight hours, his land being lighter than the above, they may plough about an acre and half a day, which brings the price for ploughing to near his reckoning of four shillings per acre. If this is not exact, he will rectify it. I shall state the ploughings and horse hoeings in this proportion, and allow three horses, though fewer will do in this land. The rent-charges, I suppose, include the tenant's taxes; if not, they are to be added to the expence. As the tythe is not mentioned in his account, I do not charge it here. The other *items* are computed in proportion to his, and the above state of the expence; and as I abated four bushels in the above crop per acre, I shall do the same here, and reckon a middling crop of hoed wheat at only eighteen bushels; his producing, by a medium of three crops, twenty two bushels and two-fifths per acre. The expence of a horse-hoed acre of this land will be nearly as follows:

	<i>l.</i>	<i>s.</i>	<i>d.</i>
Twice ploughing in autumn, with three horses, and harrowing —————	0	3	0½
Seed three pecks, (fifteen shillings and four-pence per coomb at a medium), and drilling five acres a day —————	0	3	4½
Six hoe ploughings, with three horses —	0	4	0
Hand-hoeing (at four shillings per acre, reckoned for turneps in the account) and weeding —	0	1	8
Harvesting, three shillings and nine-pence: thresh- ing four coomb and a half, four shillings and ten-pence —————	0	8	7
Carried forward	1	0	8½

	Brought forward	1	0	8
Carrying out four coomb and a half, and at market	— — —	0	4	1½
Rent-charges	— — —	0	15	0
Total expence per acre	—	1	19	9½
The three crops of wheat were sold, at a medium, for fourteen shillings and five-pence and four-sevenths per coomb, which, for eighteen bushels, comes to				
	— — —	3	5	0½
Profit per acre	—	1	5	3

The twenty acres in nine years produced seven crops, valued at five hundred and three pounds; but in the ninth year, the crop of sixty coomb is cast by mistake at eighty-seven pounds, which should be but half that sum; deducting therefore forty-three pounds ten shillings, the produce amounts to — — — 459 10 0

The expence of these twenty acres				
in nine years, as charged	—	361	10	3
To which is to be added, for four hundred loads of dung	—	20	0	0
		} 381 10 3		
Remains the profit in nine years	—	77	19	9
Which is, <i>per acre per annum</i> , near	—	0	8	8

There were eight hundred loads of dung laid upon these twenty acres; but it is hardly to be supposed, that half that quantity could be made from the seven crops; so that, at least, four hundred loads must be had elsewhere; and the dung is at a high price in that neighbourhood. I have charged but a shilling a load for it.

But if it should be supposed, that more than four hundred loads could be made from these seven crops, it must also be admitted, that a quantity in proportion would be made from the nine crops of wheat, which not being necessary in the hoeing culture, is worth, to be sold, more per

per load than I have reckoned above ; and the value of it should then be added to the profit of the hoed crops.

Let us next compare the whole profit of these twenty acres in nine years, in both these methods of husbandry.

	<i>l.</i>	<i>s.</i>	<i>d.</i>
The profit, in nine years, of the hoed crops,			
amounts to	—	—	227 5 0
The profit in that time by the common husbandry	—	—	77 19 0
Balance in favour of the new husbandry	149	5	3

Hence appears the great superiority of the hoeing culture ; and even allowing the clover had produced four bushels of seed per acre, the new husbandry is still by far the most profitable.

In answer, gentlemen, to your note upon my last letter, relating to the drill and hoe-plough, made use of by the gentlemen in Berkshire, they are the same described by Mr Tull : the drill sows only two rows for horse-hoeing. It will also sow upon the level very exactly, which cannot be said of other drills : but when a whole field is to be sown in equally distant rows, (which may be called *close drilling*), it is tedious doing it with this drill ; and for this reason I have made several others upon the same principle, which perform perfectly well ; some that will sow five rows at once at a foot distance, and plant an acre in about two hours, if the land is in good order : but these drills being expensive, and the nicety in constructing and managing them, are objections to their general use.

There is, besides, one defect in these and all other drills that I have seen ; they sow the rows at some certain distance, according as they are made at first, but cannot be altered to any other distance without taking them to pieces. I have, indeed, made some that would sow at several distances, but not without a good deal of trouble ; and yet it is necessary, in close drilling, to alter the distance of
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the rows sometimes, according to the condition of the land and other circumstances.

As I could not bring these drills to do this, I contrived another upon a different plan, to sow corn and smaller seeds, the rows at any distance required, from six to thirty-six inches, and which I mean to publish when I have full experience of its performance, it being intended as a general instrument to sow various sorts of seeds upon narrow ridges for horse-hoeing, upon the level for hand-hoeing, or closer when the crop is not designed to be hoed. It has the advantage of being cheaper than the other, and may be made or repaired by common workmen.

Though horse-hoeing is the most profitable way of cultivating wheat, it is also very advantageous to drill wheat, and other corn, in equally distant rows. More than half the common quantity of seed is saved, and the crops, though not hoed, are better than the sown crops; but when hoed, a greater crop may be raised than either by horse-hoeing or sowing broad-cast, and the land also improved. This, however, is only for one crop: but as the farmers like this way better than horse-hoeing, and as most sorts of corn, turneps, rape, &c. may be sown in this manner, it will be a general advantage if an easy, plain drill can be contrived for them, the want of such an instrument being the principal obstruction to the progress of the hoeing culture. If the drill constructed by your correspondent in Ireland can be readily altered, to sow the rows at the required distance, it seems, by his description, that it will answer in every other respect, and will be a very valuable instrument.

It was not my intention to describe particularly the manner of performing the several hoeings, &c.; therefore I have said nothing of some instruments contrived to save labour, or do the work quicker, and at a less expence. Those who would practise this husbandry, will do right to begin with a small field or piece of land, which may be thus cultivated with the common instruments. And if they have not a drill-plough, two channels may be made on
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the top of each ridge, by a small instrument, with a couple of tines in it, ten inches apart, drawn by a man or boy, and a man to follow and guide it by two handles. The seed may be dropped into these channels by hand, and then covered with two light bush-harrows, drawn in the manner described above.

There is a sort of wheat raised in Suffolk, called pollard, duck-bill, or fuller's wheat, which is said to be preferable to the other sorts for hoeing. I have tried, but have not yet succeeded, to get some of it in ear. I suppose it to be a kind of cone or bearded wheat, and therefore not in great demand at London, except for exportation. The difference in price may be, perhaps, made up, or overbalanced, by its producing a greater crop, which your correspondent can probably determine; and I hope he will particularly describe it, and how it yields, when he has an opportunity of writing to you again; and if it sells there at a lower price, and how much lower per coomb, than common Lammas wheat.

I am, GENTLEMEN,

Middlesex,
Jan. 14. 1764.

Your very humble servant,
E. S.

F R U I T S.

F R U I T S.

MUSEUM RUSTICUM, Apr. 1764. No 28.

A Letter to the Editors, on the Method of raising fine Strawberries, Gooseberries, and Currants.

GENTLEMEN,

HAVING many years ago retired from a life of business to spend the remainder of my days in the country, it was natural for me to take some delight in having my garden well stored with at least the ordinary kinds of fruit: I am not very fond of such as require a great deal of trouble, and are very expensive in their cultivation, being sensible that, when brought to maturity, they afford, at best, but a momentary gratification.

Some of your readers may, perhaps, be surpris'd at my taste being so deprav'd; but yet, I assure you, that I prefer fine strawberries to pine apples, and I am sure they are to be procur'd at much less expence.

I have of them of several kinds; and the fruit, in the season, is in great perfection, being large, and possessing a fine flavour. These I procure with no great trouble or difficulty in the cultivation.

I plant them in regular rows on beds three feet wide. The soil I chuse for them, is a good, natural, fresh, rich loam: the less it require of manure the better, the fruit being the sweeter and finer.

On each of these beds above mentioned, I plant three rows of plants, in quincunx order, at fifteen inches distance, every way; and I rather chuse to plant them each on a little hillock, as it were, something in imitation of hops.

Between the beds are intervals of the same width.

My next care is, by frequent hoeing, to keep my plants as clear from weeds as possible, by which they are sure to be supplied with plenty of nourishment; a matter of great consequence

consequence, particularly when the fruit is set, as then they require most, and the weeds are also at that season most luxuriant: I therefore then stir the earth with the hoe often, which answers, as I said before, a double purpose.

I observe to keep my plants as clear as possible from runners; by which means my fruit is larger, and sooner ripe, than it would otherwise be.

When my strawberry-plants have borne fruit two successive years on the beds, I get the alleys, or intervals, dug up and prepared, into which I transplant them in the same manner they were planted in the first-mentioned beds, which then become in their turn the intervals.

Here they remain two years more; when I again remove them into fresh land prepared for the purpose, in this manner never letting them bear fruit more than two years in one spot.

I cannot easily describe to you the great benefit this method of management is of to the plants, which are thereby greatly invigorated, and the fruit prodigiously improved, both in point of size and flavour, insomuch that they appear to be quite of a different nature from those of my neighbours, who first furnished me with the plants.

I am not less careful with respect to my gooseberries and currants, which under my management are both excellent fruits.

I generally cultivate these together in the same plantation, planting them alternately in rows, allowing each tree six feet space every way to grow in.

In the observations I have made on some of my neighbours gardens, I have long found that the principal cause of their having such wretched, crabbed, and small gooseberries and currants, was their suffering their trees to grow too thick and bushy: by which means the fruit could not possibly enjoy benefit enough from the air and sun to be brought to a due state of maturity.

This induced me to try other methods, and I at length

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succeeded

succeeded to admiration, by only keeping the trees thin of branches, by continually rubbing off the buds in the spring, and stirring the earth frequently about their roots during the course of the summer.

This method is very easy, very practicable, and very successful. Permit me, therefore, to recommend it to such of your readers as like these common sorts of fruit; though mine, I assure you, are far beyond any that are in common to be met with.

I must not forget to tell you, that in all these kinds of fruits, *viz.* strawberries, gooseberries, and currants, if the weather happens to be very dry just after they have blossomed, and the fruit is about to knit or set, I bestow a watering or two, which I find always to be of very great benefit, occasioning them to bear much more plentifully than they would otherwise do.

My plants, being in such good heart, are seldom affected by the winter's frosts; yet, if the north easterly-winds blow very sharp, I generally cover my strawberry-beds thinly over with pease-haulm, which I take away early in the spring.

As I am remarkably fond of strawberries, it is no wonder I should desire to keep them as long in bearing as possible; and to effect this, as I have a large number of plants, when they blow in the spring, I cause the blossoms to be picked off the plants of every other bed alternately. These plants, thus robbed of their early blossom, in due time put forth others; and by this simple management I enjoy my favourite fruit almost all the summer and autumn, and have even gathered them in the beginning of the month of October.

I mentioned above, that I keep my gooseberry and currant trees very thin of branches; yet, lest I should not be perfectly understood in this point, I shall explain myself a little.

The first year after planting, I permit only three or four branches to grow on each tree: these increase by degrees till about the third year, when there may be about twelve
wide-spread

wide-spread branches on each tree ; I scarcely ever suffer more : and I take care to keep them in a position as horizontal as possible, for the motion of the sap being thereby retarded, they bear a larger burthen of fruit.

I have only, before I conclude, to tell you that I permit nothing to be sown, or planted, in the vacant spaces betwixt my gooseberry and currant trees : I have plenty of garden ground, and have no occasion to do it ; besides, I think, it would hurt my fruit. I keep these spaces, however, always very clean from weeds. I am,

GENTLEMEN,

Near Bury, Suffolk,
March 1st. 1764.

Your humble servant,
A QUONDAM MERCHANT.

G R A S S E S.

MUSEUM RUSTICUM, Nov. 1764. No. 60.

*Some Account of the new Method of cultivating Lucerne
by Transplantation.*

GENTLEMEN,

I Took the liberty, some time since, of sending you, for insertion in the Museum Rusticum, an extract from Mr Randall's Semi-Virgilian husbandry, respecting the culture of cabbages at large in the field for feeding cattle ; and if I remember right, my principal reason for desiring you to give it a place was, that Mr Randall's work, being full of philosophical reasonings, would not probably fall into the hands of common practical farmers, who, being deterred from reading it on the above account, must thereby be deprived of the opportunity of benefiting themselves by the several useful experiments he has made in agriculture, many of which are recorded in the Semi-Virgilian husbandry.

Since

Since that time, another work, called *Essays on Husbandry*, has fallen into my hands, and I have read it with some pleasure: yet am I sorry to see that the author, who is a man of sense, knowledge, and experience, has fallen into an error nearly of the same nature with that committed by Mr Randall; for he is so very learned, in ancient and modern languages I mean, that, I think, I may safely conclude there is not a farmer in the dominions of Great Britain who could understand his work.

This is the more astonishing, as these essays were written professedly for the service of that very set of men who can never understand them.

To a man of education they are truly instructive and entertaining, provided he has a taste for agriculture; and, I own, I was myself particularly pleased in reading the first essay, with the author's account of the origin, infancy, progress, and improved state of agriculture: he tells us how far it is, or is not, encouraged and countenanced in the several states of Europe. He seems to have travelled a great deal; and what is much to be commended, he has made such observations as have enabled him to do his country service, by writing in praise of agriculture, which good men, in all ages, have ever held in high esteem.

However, the principal end aimed at in this publication is, to recommend a newly-discovered method of cultivating lucerne.

Mr Rocque, as may be seen in several parts of your work, has adopted the old Roman method of sowing it, broad-cast, and harrowing the land from time to time by way of destroying the weeds. Mr Miller, I think, recommends the new, or drill, husbandry for the culture of lucerne; but the author of the essays above mentioned differs from both these practical cultivators, and raises his lucerne in a nursery; after which he removes the young plants, and having cut off their stalks and tap-roots, transplants them, with great regularity, into the field where they are to stand for a crop.

I shall not pretend to decide which is the best method; yet I may venture to say, that I know it may be raised to considerable profit, both in Mr Rocque's way, and according to the rules laid down in the new, or horse-hoeing, husbandry.

I have no doubt but it may succeed by transplantation; yet I greatly fear that the expences in this method will, when applied to any considerable extent of land, greatly exceed the worth of the crop.

I have observed above, that these essays are too learned for the honest farmer's reading: It is therefore very improbable they should ever fall into his hands; yet, as it is a great pity he should not be permitted to judge for himself in a matter which may turn out so much to his advantage, I have taken the trouble of transcribing a few pages of the second essay, which more immediately treats of the culture of lucerne by this new method of transplanting.

I have in this extract omitted all reasonings that might render the narration obscure to the farmer; not that I had myself any objection to them, or did not approve of them, but as I was willing the honest cultivator should have as much of this matter laid before his view, in a plain manner, as was necessary for him to understand it: when this is done he may judge for himself; and if on trial he finds the method here recommended answer, his best way will be to adopt it in his future practice.

"Whoever proposes to sow a lucerne-nursery, or engages in any larger undertaking of cultivating whole fields of saintfoin, trefoil, buck wheat, spurrey, fenugreek, sweet melilot, &c. would be noways ill-advised, if he prepared a bit of ground, and sowed a spoonful of the seeds about a fortnight before he proposed to sow his larger quantity; since, from the good or bad success of this little attempt, he may be enabled to judge, whether the seedsman has supplied him with seeds fit for vegetation.—Without such precaution, a whole year may be lost; which is a mortifying circumstance in matters of husbandry.

In

In the end of March 1757, a common day-labourer was ordered to sow a pound and a half of lucerne-feed *, and keep the ground clear from weeds. The seeds were sown on one of the least promising pieces of land in all the neighbourhood; but this was done by express order; for it was thought unfair to make the experiment on a better soil than the commonest sort of grass-fields. The spot of earth set apart for the purposes, both of nursery and transplantation, was, in former times, a kitchen-garden: but the good soil, to the depth of eighteen inches, had been removed for the sake of manuring a corn-field. [To which we shall just add, that the attempt was made in an hilly country, where the staple earth is naturally shallow.] What remained was a cold, yellow, clammy stratum, which the country-people looked upon as mere clay; but its nature having since been better examined, it appears to be a mixture of imperfect clay, and imperfect marle.—No manure worth mentioning was used upon it, as will appear by the sequel.

To all seeming appearance, little, or next to nothing, could be expected from a piece of ground of such an unpromising cast; but, upon the whole, the experiment proved successful and easy.

By the middle of August the plants were, some of them, eighteen inches high; and many of them branched out, subdivided

* In hot counties, like Spain, Italy, &c. the husbandman usually sows lucerne, and covers the seeds with a traina (a practice superior to our bush-harrowing) about an hour before sun-set. Then the dews fall and moisten the ground; whereas the seeds are shrivelled and parched in the heat of the day, insomuch that they cannot expand themselves but with difficulty.

See LIEBAULT, *Maison Rustique*, 4to, 1617, L. v. p. 527.

I thought proper to insert this note, but apprehend it is of no great consequence in our climate. Thus much, however, it seems to imply; namely, That it is never right (even in our country) to sow lucerne during a great drought, and especially when the winds are dry and harsh.

subdivided themselves, and made very fine side-shoots: upon which it was resolved to venture upon the second part of the experiment, according to the accounts given by M. de Chateauvieux; therefore, taking the advantage of a moist season, in the beginning of September, (which season, by the way, did not last long), we performed the work in the following manner:—[But here let it be just observed, in passing along, that the time of the year pitched upon for transplanting, was, at least, three weeks too late for England, though, perhaps, highly proper for the territory of Geneva, or the southern parts of France. This therefore is set down as one of the *mutatis mutandis* so indispensably necessary in matters of agriculture, when the practice of one country is copied in another.]

First the roots were dug up carefully; orders being given before-hand not to attempt drawing them, even with the smallest degree of violence, till the earth was intirely loosened at top and bottom. In the next place, the long tap-roots were cut off eight, nine, or ten inches, discretionally, below the crown of the plant (the scissars being generally applied just beneath the forks of the root, if it be a branching root): then the stalks were clipped about five inches above the crown of the plant; and the remaining plant, after these amputations, (which may appear, at first sight, to be very bold ones), was thrown into a large vessel of water which stood by for that purpose in the shade. Such refreshment is no ways unnecessary; for this plant is very impatient of heat and sunshine after it is taken up; nay, to such a degree, (at least the first half-year of its growth), that one may almost call it a sensitive plant.—The same day, making use of a dibble, or setting stick, and filling every hole with water before the roots are put in, we transplanted them in rows, two feet asunder, and each plant six inches apart in the rows; having first made little drills, or channels, and sprinkled, or half filled them with sea-sand and wood ashes kept dry (two parts of the former to one of the latter); which was done with a view of loosening the soil, and giving a little warmth to a piece of ground which was naturally cold and clayey; nor was
any

any other manure used. The drills were afterwards once watered, to take off the dryness and heat of the ashes. The roots were placed firmly in the ground, and two inches of the stalks covered with mold.

Yet here it must be freely acknowledged, that the hopes of possessing a large crop occasioned one mistake, which we chuse rather to mention than suppress, as many people may happen to entertain the same false expectations. The mistake was, that we made our rows two feet asunder, which was over-narrow; and placed the plants, in the lines, only six inches apart, which brought them nearer together than they ought to have stood*, even though the ground was very poor: nor did we foresee, that horse-hoe-ploughing is five times more efficacious, as well as cheaper, than hand hoeings.

Therefore, after frequent experiments, since made, it appears best to make the lines three feet four inches distant from each other: and, if the soil is good, it may not be amiss to allow each plant a foot distance one from another in the lines, for thus the hand-hoers will work more commodiously, and a little horse-plough may be guided safely up and down the intervals, which will save a great deal of trouble: nor will the future crops be lessened, by such thin transplanting, half so much as may be imagined; but, on the contrary, the plants will be larger, more juicy, and better tasted; which circumstance may be extended in favour of the new husbandry in general. Space and culture improve the herbage and feeds of plants; in proof whereof I have been assured, from good authority, that all the corn raised by M. de Chateauvieux sells at an advanced price; being larger, brighter, and healthier than common corn, and, consequently, more fit for sowing, or making bread.

But, by way of confirming the necessity of allowing lucerne-roots a good share of space, a friend of the author's filled an acre with plants, according to the first directions; but, the soil proving extremely good, and free

* This acre contained about twenty-six thousand roots.

from weeds, it soon appeared that the roots stood too close: in consequence whereof, every other plant was taken up the next autumn, and, a fresh acre of land being properly prepared to receive them, he thus gained a new plantation of lucerne, at a small expence, with little trouble: and, what is more remarkable, it is thought the second acre bore a larger quantity of herbage than the first would have done, if the plants had continued as they were, without being thinned, to the amount of one half*.

—Of course, there is reason to conclude, that this slight hint, which took its rise from mere accident, ought not to be looked upon as quite unuseful, since two acres may be raised with almost the same expence as a single acre †.

In ten days, though a drought succeeded, some transplanted plants made shoots of three inches height; which vigorous growth gave better hopes than had been conceived at first.

It was also some encouragement to the undertaker, that he found wild lucerne ‡ within two musquet-shots of the place where the nursery was formed. These plants were certainly aborigines; for they grew in a part of the kingdom where the name of lucerne had rarely been heard of, except by gentlemen. Besides, no person curious in husbandry would have ventured sowing the seeds in such an

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unpromising

* I have lately been informed, that M. Eyma was once forced, by the same necessity, to take up every other row in the year 1757.

† In a deep soil, the roots of drilled lucerne, untransplanted, may stand nearer than the roots of lucerne transplanted; as the former make not such large lateral shoots, and procure subsistence at a greater depth. This I observed, last year, in a patch of lucerne, raised at Winchester, in very rich ground.

‡ This was the species of lucerne called *medica palustris*, or *meadow lucerne*. St Liger, and other husbandry writers, suppose (erroneously, as I imagine) that the red honey-suckle, perennial clover, in dry, sweet, upland pasturages, is a wild degenerated lucerne.

unpromising piece of ground; for the field, where the wild lucerne grew, was a sort of coarse, uncultivated morass, and valued only at about two shillings and sixpence an acre.

Yet still the approach of winter made many persons doubtful concerning the success of this new plantation; nevertheless, it was some satisfaction to recollect, that there is less harsh, severe cold in England (and that almost by one third) than in the territory of Geneva, where the original experiment was made, and where the plant we are speaking of has been known to thrive so extremely well.

At length the winter passed over, and, out of four thousand roots, only thirty or forty perished, whether by frosts, immoderate rains, or any other accident, is hard to say; but the labourers filled up all the vacant spaces from the nursery in about an hour, and in April, 1758, most of the plants were nearly equal in size and strength, of a deep juicy verdure, with a few or no discoloured sickly leaves: but, May the eighth, people counted sixty stems from one particular root, and the stalks and leaves of some chosen plants weighed near half a pound at one cutting. Yet we learn, by experience, that lucerne must only be considered as in a progressive state, till the third summer after transplanting; and then M. Hu Hamel assures us, that one flourishing plant will produce a pound of well-dried hay; which is saying a great deal, and much more than I could ever verify; for, if a single plant produces one pound of hay, it must have weighed four pounds when it was green. Yet I have received an account from an eminent physician in our own country, (who planted two acres of lucerne by my directions), that many of his plants, in the second year, yielded near half a pound of hay each plant.

As an acre of lucerne, thus managed, will contain more roots than one is apt to imagine at first guess, how great must the produce be of four or five cuttings every year, and those confessedly the most nourishing and palatable food that cattle can eat? For thus much is certain, amongst

mongst other advantages, that, if a field be industriously hoed, ploughed in the intervals or spaces, and hand-weeded in the rows, for the first two or three years, it is almost sure, that horses, cows, or sheep, will hardly find a single weed in a large quantity of green food.

We will now mention the state of our transplanted lucerne in its second year, namely, 1758.

And here let it be remembered, that what cultivators call a proper time for cutting is, when the plants are about fifteen or sixteen inches high, at an average, throughout the field: but this must be understood in a relative sense, for some plants will be two or three feet high, and others may not be above ten inches, or one foot, in height, according to the circumstances of health, space, situation, &c. of the several roots.

The cuttings of the year 1758 were as follow: May 8th, June 7th, July 12th, August 20th, and October 1st.

In the year 1759, it was cut five times, and six times * in 1760; which made sixteen cuttings in three years. Nay, by the ninth of April, in 1760, some of the lucerne plants were near seventeen inches high, at a time when no field in the neighbourhood had grass of four inches height, though you took five or six acres together. The same lucerne was cut twice, before any hay-making began in the country round it, if we except some few meadows lying near market-towns.

Having carried on my first experiment thus far, upon almost as unpromising a piece of land as could be found, and being sensible I had made some mistakes from want of experience, (having as yet never seen any transplanted lucerne in England), I gave directions for making a small plantation in Berkshire; but still took care to chuse a field that could hardly be called middling land. It was overrun with coarse weeds, had been long out of tillage, and the earth, in most places, was hardly four inches above a
bed

* The sixth cutting, if it be after the first week in October, is little more than nominal.

bed of chalk ; which, (let farmers say what they please of it, in respect to faintfoin †) is no ways favourable to the growth of lucerne, especially if the latter be transplanted ; for the chalks flakes, when thaws and rains come on ; and it either heaves the plants out of the ground, or exposes the fibres of the roots too much to the cold. Yet upon this I ventured with my eyes open ; for Pliny (whose authority I scruple not to take, when I have no other) had given me a caution concerning lucerne raised upon chalky lands : but what induced me to make the attempt was, that the goodness of the soil might not lead me to say more concerning the success of an experiment, than other people may hope to find.

The little field, or close, consisted of one rood of ground, or a quarter of an acre ; which we threw into fifty-four rows, each row containing one hundred and ten plants, or five thousand nine hundred and forty in the whole. In the second year after transplanting, (and lucerne is not then arrived to its due size), and at the first annual cutting, (which is not the best cutting, as the herbage suffers much from the winter), I weighed, out of curiosity, a parcel of the prime plants, which, one with another, weighed about one pound and a quarter each. But supposing that every plant weighed only one quarter of a pound, and admitting we give up the sixth cutting, (which is more than one needs to do), then the crop of forty perches, or one fourth of an acre, amounts to a very considerable return of ten tons, at least, of green lucerne per acre.

An acre of transplanted lucerne, rightly managed, will bring in five pounds a year, free and clear from all expences, and that for a considerable tract of time. Now certainly this advantage deserves well to be considered ; for the husbandman is said to be a good manager who makes three rents each year ; a first for the landlord, a second for labour, &c. and a third for himself : but an acre of lucerne will,

† Lucerne and faintfoin require the same soil and the same no two plants being more alike in every respect.

will, for several years, produce five rents, clear of all outgoings for rates, rent, workmen, manure, &c. supposing the land to let at fifteen shillings an acre, as usually happens in most estates that lie at some distance from cities and market-towns. On the contrary, if land be dearer near rich populous places, the ground will be better, and the produce more advantageous. This gives lucerne its value near towns and cities, where two or three acres may be rented, but ten or twenty cannot; and sure it is some advantage in husbandry to make one acre supply the place of two or three, and especially where it is difficult to rent land, even at a very high price.

It is certain, that the profits arising from transplanted lucerne have been no ways exaggerated in my account; for by some collateral observations it may be easy to carry the value of an acre something higher than has been here represented. Suppose green vetches (which are rarely cut more than once) and green lucerne to be of equal value as food for horses (which is making a supposition no good writer on husbandry will allow to the disadvantage of lucerne); now a perch of green vetches (if the crop be good) sells for sixpence at seventy miles distance from London, and a perch of transplanted lucerne will weigh as much, or very nearly as much, as two cuttings, out of the four or five annual cuttings; which (every circumstance being duly considered) brings an acre of lucerne (to say the least of its advantages in husbandry) to be of equal value with two acres and a half of vetches; not to mention that lucerne is a perennial plant, and vetches are annual; which, upon the whole, makes a new difference in point of profit.

As I think it unfair to suppress any unsuccessful circumstances in matters of husbandry, I will here ingenuously confess, that the most material of my mistakes were these:—I followed my foreign instructions (which, at that time, were but few) with too much diffidence, and in too literal a manner.—I was not enabled, through want of experience, to adapt the husbandry-practices of
other

other nations to the English climate.—I transplanted too late, filled my rows too full, and allowed not sufficient space for the intervals.—By following the French directions over-closely, I cut the tap-roots too short in the best plants, and knew not (as it is a point unmentioned by any cultivator of lucerne) how to manage a root that was very small.—The means of avoiding and rectifying all which mistakes and difficulties, are, by the help of subsequent experience, carefully pointed out.

And here it may be worth considering how to apply a field of lucerne, carefully and industriously cultivated, to the greatest advantage.—In such a case, let us suppose the plantation to consist of two acres, and that four large horses are to be supplied with green fodder, from the end of April till Michaelmas. Now, in order to manage this affair with dexterity, count the number of rows or lines in the lucerne-field, and place in one of the head-lands thirty land-marks, at equal distances; and thus, having cut a proper portion, day by day, you will be ready to begin a-fresh, after the last cutting.

When I say you will be ready to begin a-fresh at the end of thirty days, I must desire to be understood, with a small degree of latitude: for physical accidents are so numerous and unavoidable in regard to the growth of plants, (though lucerne is liable to fewer checks and miscarriages than most other cultivated field-vegetables), yet still the nature of the thing will not allow us to predict the time of each and every periodical cutting with much certainty.—Nevertheless, thus much may be depended upon, even for some years successively, that, after the first annual cutting, our directions, here given, will be attended with no inconvenience to the owner; for there will rarely be more than three or four days difference between the times of the second, third, and fourth cuttings:—nor will the want of lucerne-fodder, during such short intervals, be of the least ill consequence; for, surely, that husbandman must be a very improvident manager who has not other grass-fields by way of a momentary supply.

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The times, therefore, of the second, third, and fourth annual cuttings, are tolerably certain; but the first cutting, according to the nature of the winter, may be accelerated, or retarded, a fortnight, three weeks, and, perhaps, a month.

The time of the fifth cutting is also, in some degree, variable and uncertain, as the solar heat decreases, and the days grow shorter. A sixth cutting, which is seldom of much consequence, chiefly depends on a fortunate season, in conjunction with the industrious good management of the cultivator.

From this succession of fresh green food appears one singular advantage in raising lucerne: and in the next place, care must be taken, that your plantation be always proportionable to your number of cattle; or, in other words, let it be a rule to you to have rather over-much lucerne, than too little; for then one cutting may be set apart for hay, which may be given occasionally to favourite horses and sick cattle. But in case no hay is made, the owner of the ground, even then, by means of the supplies he derives from green lucerne, will be enabled to spare a large quantity of other grafs for hay-making; and thus two acres of lucerne will give him the power of saving two or three tuns of hay more than he could have saved otherwise; consequently lucerne, in effect, helps to keep cattle both in winter and summer.

By such sort of husbandry, and provident management, the stock of hay for winter will be considerably increased, and the owner enabled, for the space of five months at least in the other parts of the year, to allow his horses very nearly the same quantities of green food each day; all equally fresh, wholesome, and well tasted: which single circumstance (if it related to horses only) gives lucerne the preference over all other sorts of green fodder hitherto known, and in process of time may be applied (as has been experienced with much success) to the fattening of horned cattle, provided such cautions are used as shall be specified hereafter, and which ought always to be remembered.

membered.——Now whatever increases the number of cattle, augments the quantity of dung necessary for carrying on the more successful cultivation of arable lands; and whatever, by multiplying the number of cattle, affords more animal food to man, will of course contribute towards lessening the price of meat, which will assist society in general, and more particularly the manufacturer and peasant; for the grand secret of well-managing a trading populous country is to supply the inhabitants with flesh and corn upon easy terms; for then mankind will multiply of course (supposing the government to be mild and equal); nor will other nations undersell us in the commodities we export to foreign markets.

Now lucerne, in matters of husbandry, comes the nearest, of any article yet known, towards attaining the points here proposed; forasmuch as one acre of land, thus cultivated, will support as many cattle in spring, summer, and a part of autumn, as four acres of common, natural, up-land grass did before. But this use of lucerne is still greater, if land be scarce; or if the nation be populous, and the soil has been cultivated to the extent of the old husbandry: for then the introducing this plant is, in effect, the same as creating new land, if the superior produce of lucerne, both in quantity and quality, be fairly considered by us.

Yet one thing must be well understood in the new practice of raising lucerne. Negligent husbandmen, and such as expect good crops without labour, expence, frequent ploughings, weedings, &c. would act a wise part in not attempting to cultivate the plant here mentioned; nor is it adviseable for gentlemen of fortune to commit this part of husbandry to bailiffs and servants, who (be their masters advantage ever so great) will not like the labour (though they are well paid for it) of turning fields into a sort of gardens, and, besides all this, may conceive a prejudice against improvements, and take some small delight to see them miscarry: so that all random, careless, and insincere methods of culture must have nothing
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to do with raising plants, which, though hardy and long-lived after they attain a certain age, yet are surprisingly delicate and tender when they are young, or when first transplanted; and more especially if wild couch-grass and other weeds should spring up amongst them.

For these reasons, at first setting out, I must advise every good cultivator to be particularly industrious in the extirpation of weeds, and that he over-burdens not the strength of the earth from a principle of avarice, but allows her the just refreshments of manures, and gives her at least some breathing-space of ease and repose.

It is highly unreasonable to expect success in the management of this plant without care, and highly improbable (if the seeds are good) to miscarry with due care. It is true, many people have failed in the process of this experiment; but then one is generally enabled to point out the error, as likewise the cause of ill success, with tolerable exactness. To begin well in cultivating this plant is doing but little; rules and directions must be cautiously observed for three, or two years at least. Few people make mistakes in the beginning of an experiment: but, generally speaking, after three or four months are expired, the master's attention and keenness wear off, and the bailiff or gardener (as sometimes the raising of a lucerne-nursery falls in the province of the latter) are extremely glad not to refresh his memory: for the one does not like an additional trouble out of his department, (a punctilio which has great weight with all servants); and it is a maxim with the other, never to admit any thing new in matters of husbandry, but admire those sorts of crops which Columella describes, crops that can hold up their heads and prosper under all the negligence of a pretending cultivator.

It is true, many difficulties and discouragements attend making experiments. The continuance of life is as short at that of art is permanent;—and few husbandry-experiments can be made oftner than once in a year:—nor must we reason too much by analogy, from success in one pro-

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duction,

duction, to success in another of a different species.—Attention also is required, and that even to the minutest circumstances:—and again, too many experiments die with the observer; which, though highly useful, did not appear considerable enough for human vanity to establish a system thereon.

Yet still all these difficulties and discouragements may be counter-balanced by the advantages which result afterwards to society.

Lucerne cannot easily be freed from manifest disadvantages by any other method of culture than what is here recommended. That it has usually miscarried, when sown with spring corn, after repeated trials in this kingdom, from the year 1577 to 1764, is well known to many readers; for common wild grass, and particularly couch-grass, may be called its destruction, if not its poison, principally indeed by starving the roots of it, but probably from its effluvia too. This likewise I have always observed in plants of a different species that stand too near each other; they immediately, as it were by a declaration of war, contend for mastery: the roots are constantly attempting depredations and encroachments upon each other; whilst the stalks, especially those of weeds, make the same efforts in longitudinal shoots; and that plant, which over-tops the other, provided the shoots are equally thick and strong, always gains the victory, and, by over-shading and dripping upon its antagonist, forces it to dwindle away and perish. This struggling for life and mastery draws up the plants too weak and spindling, and the conquered plant usually dies. Now weeds, generally speaking, are more hardy, savage, and hungry, than manured vegetables. If such be the case, where is there a country to be found that abounds with foul grass and weeds more than England? So that, if lucerne be sown in the usual way amongst corn, like rye-grass, clover, and hop-trefoil, no care can keep an acre clean. It may last two years, (only one crop being tolerable), and then must perish in the common course of nature. A gentleman

very

very lately made this experiment (in good measure against his judgment) for the sake of farmers, in hopes of finding out a cheap, easy, and compendious method of raising lucerne; but the crop, at the end of fifteen months, was as near being over-powered and starved as can be imagined; which made him venture to take up and transplant the few good roots that remained, which, being freed from the bad neighbourhood and incumbrance of coarse grass and other weeds, appeared to prosper very well. Again, if lucerne be raised in drills, according to the best directions hitherto given by our ingenious countrymen, Tull and Miller, (who, to do them justice, were the first persons, amongst our modern writers, that saw the great advantage of this grass, and pressed the culture of it strongly on the English nation), certain it is, that such a method will greatly exceed the promiscuous sowing of lucerne with spring-corn. Yet still, in the practice of drilling, a considerable part of the seeds may be faulty, and then the rows will appear naked and unsupplied with herbage: nor can the hopper be supposed always to drop the little grains at precise distances plant from plant. Nevertheless, such persons as prefer drilling may fill up all the vacant spaces with transplanted roots.

In the method of cultivating lucerne, which is here recommended, an acre will be found to contain about such a number of chosen healthy roots as the ground is capable of supporting, and admit a greater number of them than the reader will be apt to imagine, *prima facie*; for it will hold, according to my first experiment, about twenty-six thousand plants: but, if the ground be clean, rich, and well conditioned, it may be more adviseable to observe the greater distances already mentioned; upon which principle, the acre will contain about thirteen thousand plants; and this is the number, all things considered, I am most inclined to recommend; for the produce of such an acre will be full as large and profitable as the former, and the ground will be managed with less expence and more convenience.

It may be observed farther, that, in transplanting lucerne, there will be one advantage (and that no small one) which can never be obtained in drilling, or promiscuous sowing; each root will stand at a proper distance from its neighbour, and receive its allowance of food in due quantity, without diminution.—In the next place, you will seldom see a plant wanting, and rarely (except by mistake) a plant supernumerary: but, if a few sets should chance to die, it will be easy to supply the vacant spaces from the nursery, and that, as people find by experience, in any moist day, from April till the middle of September.

There is another advantage which arises from transplanting lucerne; for, by cutting the tap-root*, you prevent its penetrating ten or twelve feet perpendicular into the ground, which the plant naturally does in three or four years, except it be obstructed by a *stratum* of rock, or chilled at root by weeping springs, or finds admission in a bed of cold watery clay. Then the crop makes a poor appearance, or, perhaps, goes off all at once.

People who hand-hoe or horse-hoe lucerne, need not give themselves much pain about breaking or cutting off a lateral root accidentally; not but that some care and caution must always be used; however, what seems to injure the parent-plant proves, in the end, no-ways disadvantageous to it; for horizontal, or side roots, thus cut, or broken, push forth new roots and filaments laterally; and thus the suckers, or tubes that suck nourishment, are multiplied by a cause which had the appearance of lessening their number. Yet transplanted lucerne will no-ways bear such rude treatment as the ancients sometimes

* It was a received opinion, amongst our ancestors, from time immemorial, that the amputation of a tap-root, in tree or plant, was dangerous, if not fatal; but Gabriel Plattes, about one hundred and fifty years ago, seems to be the first who had experienced, that such an operation might be performed not only with safety, but successfully.

Pratt. Husb. Improved, or a Discovery of Infinite Treasure,
4to, 1656, p. 15.

times gave to untransplanted lucerne, when they thought fit to make it undergo the discipline of harrowing.

How long lucerne may last cannot be known by the experiments which are here related, namely, from the spring of 1757 to the beginning of the year 1764; but some persons of credit have observed the plants to continue in good strength and health near twenty years. [I suppose they mean here and there particular plants, and not a whole plantation.] Tull, indeed, tells us that, except lucerne be choaked or starved by grass and weeds, he hardly knew when to say it would die a natural death; and probably it may not prove the less long-lived for being transplanted; since hand-hoeings, horse-hoeings, and digging, will give new strength and health to the plants. The spreading of the roots will be facilitated by loosening the soil, and letting in the good influences of the atmosphere:—their growth also will be augmented by giving them that additional nourishment of which the weeds defrauded them:—and, in the last place, all manures will more easily reach them; for thus much is a certain fact in husbandry, that, when the ground is rendered clean, light, and penetrable, the roots love to expand themselves, in order to procure a greater quantity of nourishment.

I fairly acknowledge that I am not enabled, from my own experience, to fix the common duration of lucerne, whether transplanted or drilled (and that from no difficulty in the thing itself, but because a sufficient number of years has not elapsed since making my experiments); but thus much I can take upon me to say, from my own knowledge, that lucerne sown at random, or by what we call promiscuous sowing, as the ploughman sows rye-grass and clover, (whether with or without spring-corn), will not last to any tolerable purpose above two years, or three at most. But, as this plant is of the greatest use and value, where land is dear and scarce, as near cities and towns, I see no reason to doubt, but that the same spot of ground may be continued as a lucerne-plantation for half a century at least: for if the rows are three feet four inches wide,
(which

(which I look upon to be a *sine qua non*), then, whenever the old lucerne decays, new lines may be planted in the middle of each interval, which has lain fallow, and also been manured and pulverized for a considerable number of years; and thus progressively, *vice versa*, to a long continuance.

Not being able therefore to give positive satisfaction concerning the continuance of lucerne rightly managed*, I shall propose something that is not merely a query, and which, perhaps, may give the reader an equivalent information. In a few words, it is as follows: when lucerne is grown old, and the owner proposes to break up the plantation, layers might be made from all the principal stalks, and removed into fresh ground. These layers, in all probability, may succeed extremely well, according to some few experiments made abroad in the years 1755 and 1756.

As to the expence and risque of cultivating small quantities of ground, agreeably to the method here laid down, it is to be hoped that curious gentlemen will not be deterred by some few minute difficulties or objections, but give the present experiment fair, patient, and repeated trials; for neither the out-goings nor the hazard will be very considerable. But at present it is no ways our intention to persuade farmers (at least such as are in low circumstances) to quit their little certainty for an advantage which may appear to them quite uncertain.

Let them wait, at least, for a few years, in hopes some cheaper and more compendious method may be discovered for their sakes; and if, at present, they make any experiments, let them be in small.

The first point of consideration, when I undertook to recommend transplanted lucerne to the publick, from my
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* M. du Hamel observes, by way of result from his experiments, that nine or ten years is the common date of transplanted lucerne, except it be managed with great art and skill.

own experiments, was to bear constantly in mind whether the profit counterbalanced the expences and labour of culture, and that in a double, or even treble, proportion; since, otherwise, I was doing little more than postponing utility, for the sake of introducing a new sort of husbandry, which only deserved to be called ingenious.

We all know that the farmer expends much money, and gains very little from a crop of wheat at the expiration of his twelve months; but if we take ten years together, and compare the profits of lucerne on the one hand, and wheat, barley, oats, and clover, on the other, the balance will certainly turn in favour of the lucerne-crops, and that in a proportion of three, or two, to one, at least.

The expence of raising an acre of lucerne in the manner which we recommend, (and supposing even digging to be made use of instead of ploughing), amounts, as nearly as I can remember, to the following sums :

	<i>l.</i>	<i>s.</i>	<i>d.</i>
Fine digging and picking thirty perches for a nursery *	—	—	0 12 0
Seed	—	—	0 7 0
Hand-weeding the nursery twice, and transplanting into vacant patches such plants as stand too thick	—	—	0 13 0
Digging an acre for receiving the roots	—	2	10 0
Transplanting	—	1	5 0
Hand-weeding and hand-hoeing the rows, with a four-inch hoe that cuts downwards, and then with a larger plantation-hoe which cuts horizontally	—	—	1 0 0
Two horse-hoings	—	—	0 5 0
Total	—	6	12 0

It

* For fear of accidents, it might not be amiss to set apart a quarter of an acre for a nursery. An over-plus stock of plants will enable the owner to pass by the weaker ones, and leave them to remain for another occasion. I subjoin this caution, as I have before mentioned only thirty perches: and thus every cultivator may follow his own judgment.

It is true, the expences of raising lucerne, in this manner, will vary, when applied to parts of England different from those where the experiment was made, as the price of labour may be dearer, and rents run higher; but then the ground ought to prove better, which will balance the difference.

This plantation of lucerne may be cut three times, the first year after transplanting, as some repayment for the out-going expences: next year the profit will be more considerable.

On the other hand, those who prefer the drill-method of raising lucerne, as less expensive, may seem to save about two pounds, or more, upon an acre, at the first appearance of things; but then the rows, in case the crop succeeds, (which is a doubtful point,) must be thinned with good judgment, which will cost money; and the vacancies in them must be filled at last with transplanted roots: nay, M. de Chateauvieux asserts, that drilled lucerne will rarely be so large and flourishing as the transplanted; for the effects of horse-hoeing, and the influence of manures, may prove of less service to the roots of the former, at a depth of twelve or thirteen feet, than to the roots of the latter, whose finest imperceptible fibres will hardly descend above a yard perpendicular.

It is hard to say at what precise time the assistance of the hoe-plough should be called in; but the owner of the plantation may venture on the attempt, I think, with safety, in three days after the second cutting, about the beginning of June*; for the roots then will be tolerably well settled in the ground, and before that time the flat plantation-hoe may be used, choosing such an one as is about eight inches and an half wide in the cutting part.

As continued hand-hoeings will be chargeable, troublesome, and almost endless, (being, in truth, little more than a temporary expedient, and slight scratching the surface of the earth), remember to make a light plough, with
which

* This relates to lucerne transplanted in August.

which you are to cultivate the spaces between the rows; and in this case you may either invent a plough according to your own fancy, or copy such as are used at home, or in other countries, on the like occasion.

The share of this plough should be sharp, about sixteen inches long, with a coulter proportionable; the plough itself no heavier than a strong lad of fifteen years of age can carry: and thus one horse, after some obstructions of no great consequence in the first attempt, will afterwards draw it with ease. Yet still the trouble will be lessened, if the field be prepared by digging and picking up the roots and stones, instead of common ploughing, just before the ground is to receive the transplanted roots: therefore, after a full second consideration, the former practice is recommended preferably to the latter; and, if the lucerne stands nine or ten years, the difference of the expence will not be perceived.

As the rows will be one yard four inches asunder, there will be room sufficient to guide the plough safely along the intervals, and yet no room to spare: it behoves the ploughman therefore to be extremely careful in the slice he cuts next the lines: such a stroke must be a shallow and a dexterous one; nor must he approach too nearly. A man, an horse, and a boy to lead the horse, will manage an acre in a day when they know their business, for it is more a matter of nicety than fatigue, since the ground ploughed in an acre will hardly exceed half an acre.

After the first time of using the horse-hoe plough (which a man's own discretion, upon considering the strength of the plants, will best determine) it may be laid down for a general rule, *that it will be always found most convenient to horse-hoe the intervals (as long as the plantation stands) the third day after each cutting; for by that time the new shoots will make the plants visible, nor will any side branches stand in the plough's way.*

It may be proper also to hand-weed the lines once a-

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year;

year ; and the larger weeds may be taken up expeditiously with the three-pronged spade, or the field-spade *.

We will now consider the expences of an acre of lucerne the second year, which will stand as follows :

	l. s. d.		
Clearing the lucerne-plants from weeds in the rows by hand	—	—	0 8 0
One hand-hoeing of the intervals	—	—	0 8 0
Four horse-hoe ploughings	—	—	0 11 0
Compost-dressing for manure, or foot, wood, or peat-ashes, at an average per year	—	—	0 10 0
Dispersing the manure	—	—	0 3 0
Total	—	—	2 0 0

Such will be the yearly charges, or in some proportion very like them, during the continuance of your lucerne, which I fix at a medium of ten years : M. de Chateaufieux says it may last twenty ; and Pliny goes as far as thirty ; tho' the expression may be looked upon to be exaggerated †.

In regard to manuring lucerne, it may suffice to suggest here in general terms, that, if the ground be stiff, cold, and of a clayey tendency, then wood-ashes, foot, and lime are proper dressings. If the ground be hot, shallow, and brashy, a compost of calcined clay, dung rotted to a fine mold, and pond-mud, long exposed to sun and frosts, and frequently turned, may have its use : and if the ground proves of a middle nature, then malt-dust will not be amiss. All these manures are easily procured, and therefore

* The field-spade, for taking up weeds, should be two inches and an half longer in the bit than the London garden-spade, and one inch and an half narrower between side and side, being, at the same time, well pointed with tempered steel.—This implement of husbandry is chiefly used by foreigners in cleansing fine grass-fields once a year, in April. When the weed is taken up with all its roots, a few grass-seeds are sprinkled on the spot where it grew ; but this relates to common pasture-meadows.

† *Hist. Natural.* lib. xviii. c. 16.

therefore we have mentioned none that are scarce and dear; but as variations of soil are infinite, and few people know the true nature of any field, (especially if it be of the mixed kind) we recommend the compost-dunghill, as the surest and most universal assistant upon such occasions.

Many other manures may be good for lucerne, but dung probably is not one of the best, except it be very old, and well corrected with proper mixtures of a sweet, as well fertilizing nature, sufficiently warm and cherishing, but no-ways rank; for dung (especially if it be new) produces in general very luxuriant, troublesome weeds, insects in abundance of various kinds, and gives the grass a foul, cloying, putrified taste.

The owner's eye, it is true, may be deceived, and his hopes encouraged by the largeness of the crop; but the sagacious four-footed animals will distinguish better than we can pretend to distinguish; and, if they could present a petition to their masters, as the white heifers are reported once to have done to the Emperor Julian, they would remonstrate not a little against the immoderate use of this manure. Nevertheless, assertions like the present ought to be confirmed by some proof: an experiment therefore was made upon four acres of grass ground, of which one half was dressed with stable dung, and the other with wood-ashes kept dry. The former moiety appeared the most rich and luxuriant of the two; but the cattle always neglected it, till they had bitten the latter down to the bare earth.

Having thus given the result of my experience in regard to dung as a manure for lucerne, I shall subjoin only one short caution, which is, that no dung, not even of the best kinds, must be spread on a lucerne-plantation, till it be two years old at least.

In all grounds inclinable to moisture, and such particularly as are of a clayey cast, it is pretty certain that the preference ought to be given to foot-dressings, and, after foot, to chimney-ashes, (those of green wood especially), provided they are housed and secured from wet; then
 soap-

soap-boilers ashes may take place, coal-ashes well sifted, charcoal-ashes, and malt-dust; nor might the ashes of lime be amiss, nor lime itself, when mixed with such fine mold as may be found under a short sweet turf, in lanes or commons. The compost-dunghill also, as observed before, should be applied to, which, at the end of twelve months having been thrice turned, will spread almost as well as ashes or foot: nor will such compost want strength when it is rightly managed; for if the dunghill be moistened at times with the brine, soap suds, dish-washings, and chamber-lice, &c. of the family, then, when it is removed into the fields, the sharp, pungent, strong salts, which fly off, will make the labourers sneeze, and occasion a smarting in their eyes.

When you manure lucerne with foot, dry chimney-ashes, lime, soap boilers ashes, &c. it is sufficient to dress the rows only, because these finer sorts of manures may be dispersed in the nicest exactest quantities, if sown, in the Berksire manner, with a peat-ash spoon; but if coarser manures are to be employed in larger quantities, as old dung, marle, compost dressings, &c. I would then advise the proprietor of the field to manure the intervals and rows promiscuously.

Nothing can be more cheaply and easily managed than manuring lucerne with foot dressings; for the labourer, if he makes use of a peat-ash spoon and seed-slip, may sprinkle the rows of an acre in four or five hours, walking down the first interval and returning by the second, and so progressively.

Ashes may be sown in the same manner.

It may not be amiss to answer a couple of questions which have been often proposed to me in letters.

The first question is, How, and in what manner (by way of result from the considerable number of experiments made by me) I would advise any gentleman to prepare three or four acres of land for receiving lucerne? this being an undertaking of some moment.

The second question is, How to perform this work in
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the shortest, safest, and most æconomical manner?—Concerning both which points my ideas are as follow, this only premised, that I am here endeavouring to make the expence of the undertaking as cheap as possible, otherwise, where people pay no regard to a few incidental charges, I would recommend Mr Boyle's method of preparing a field for receiving transplanted lucerne, who began his experiments of lucerne in the same year that I did, but proceeded upon a larger scale, for he undertook the culture of six acres at once.

His preparation of the field was as follows :

In the year 1757, he gave his field a summer-fallow, and having thoroughly ploughed and harrowed it, (not as farmers understand these words, but effectually, instead of superficially), he sowed wheat after the ground had been dressed with lime. In 1758, his crop of wheat was very great. Immediately after harvest, he gave the land in question a severer discipline, using every method for pulverizing the earth, and extirpating weeds, that the best husbandmen are acquainted with, either in our kingdoms or abroad ; so that the field appeared again a perfect fallow. Then plowing it very narrow and sharp, he made water-thoroughs with the plough, and left it in this condition for the winter 1758.

In spring, 1759, he made many French drains in the field, as before he had made open ones for the winter ; and, by stone-picking the land, had nearly stones sufficient to fill them. In March, the same year, (taking advantage of the first fine weather), he slit the ridges with the plough, and reduced the land to the finest tilth he was able, and transplanted the lucerne from his nursery in autumn ; in the whole process of which, he followed Du Hamel exactly.

Nothing in husbandry could be more sensible and masterly than this preparation of a large piece of land for receiving lucerne.

In the present case it may suffice to say, that supposing the nursery to be properly prepared, and the seeds sown in
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the first week of April, before the season for transplanting, according to directions already given; I would recommend a field in good tilth, after barley-harvest, and before oats have been sown in it. This field should be thoroughly ploughed and harrowed twice, which we will suppose to be, for example, in the autumn of the present year, 1764. After each ploughing and harrowing there should be a very diligent burn-beating. But, if the season should prove too wet at the time of a second burn-beating, we make a virtue of necessity, and the weeds and trumpery must be raked together and carried off.

Then give the field a trench-fallow ploughing for winter, and early in March, 1765, (if the weather any-ways permits), having manured your ground as the relative nature of the soil requires, and ploughed and harrowed it again to an exquisite fineness, drill in a crop of field-pease, as early in the spring as is consistent with prudence and safety; for this crop must be ripe, and removed, by the last day of July. Much depends upon this point of foresight: however the pease, by standing thinner than in hand-sown promiscuous crops, being at the same time banked and hoed with greater ease, and enjoying more room, free air, and sunshine, will, in all probability, gain an advance of ten days, at least, in their ripening. This will be a great point secured; for it is in husbandry as in war: there are critical moments, which never present themselves a second time in the same campaign.

This pea-crop being hacked, and moved from the field by the fourth or fifth of August, call in all the assistance you have of husbandry-strength, or can procure, and plough and harrow the field, and burn the pea-roots, weeds, &c. as often as you have time, before the twentieth of August; and then (your nursery being supposed to be in perfect readiness) transplant your roots as before directed, and contrive to close your work by the end of the month."

Having thus, I hope, put your farming readers in a capacity of judging for themselves in a matter which I think

of some importance, I shall take up no more of your time,
but conclude myself,

GENTLEMEN,

Your very humble servant,

October 25. 1764.

EBORACENSIS.

G R A S S E S.

MUSEUM RUSTICUM, April 1765. No. 70.

*On the Culture of Lucerne by Transplantation, with a
Hint or two relative to Burnet.*

GENTLEMEN,

AS the letter I wrote to you lately, chiefly on the culture of burnet, has gained a place in your useful work, I am tempted to send you my sentiments on the culture of another very valuable grass, I mean lucerne; of which having seen, read, and heard much, I determined to have some of it myself; and Mr Miller's method seeming to me by far the most rational, I resolved to follow it: accordingly the seventeenth of July, 1763, I ordered a field of three acres and a half, then under rye-grass and clover, to be ploughed deep, and sown with turneps. The crop was middling: I sold them to a cow-farmer for nine guineas: he drew and carted them home. If I had had sheep, I would have fed them on the field.

By the twenty-seventh of March, 1764, the field had been twice ploughed, the first time ten, and the last time near twelve inches deep, with the Rotheran-plough and four horses a-breast: the soil is light and stoney, with a rock of gravel about ten or twelve inches deep, and had never before been ploughed above six or seven inches deep; however, I knew it was right to go as deep as I could for a tap-rooted plant, as the lucerne is.

Here I must inform you, that about this time my book-
seller

seller had recommended to me Mr Millis's Complete System of Husbandry, and sent me the three first volumes. I was greatly pleased with reading Mons. Lullin's account of his method of transplanting lucerne, and determined to follow it, from a full conviction that it must be superior to every other method.

Accordingly I ordered the field to be sown with Poland oats, and laid out about twenty-eight rods in beds four feet wide, alleys one foot and a half, which were sown with lucerne in broad-cast by my gardener, in the same manner as you sow cabbages or favoys in seed-beds: one bed, however, out of curiosity, I ordered him to sow in the following manner.

Run a garden-line through the middle of the bed from one end to the other; draw a small drill along the line, about half an inch deep; then move the line six inches, and make another drill, and so on: by this means you will have nine drills on a bed four feet wide. When this is done, fill a quart or pint bottle near full with your lucerne-feed, cork the bottle, bore a hole in the cork, and insert a quill cut at each end: this will be found a great assistance in sowing the seed thin and regularly in the drills*: and I must observe, that the bed which I sowed in this manner, afforded me much the greatest quantity of plants, and by far the finest. Another advantage attending it is, that it is kept clean with much more ease, and far less expence; for a gardener, with the small three-inch hand-hoe, will clean a great deal of ground in a small space of time. When the bed is sown, the seed must be covered with care: rather chuse the backside of a small rake than the teeth.

By the middle of August, my plants looked very well, and were mostly in bloom, when I ordered them to be
mown,

* The quill must be of the largest sort, a small tin-tube, such as seedsmen use to tap sacks of small seed to draw a sample; or a hole in the cork, of such size as will let the lucerne seed pass freely: any of them answer the purpose. MACO.

mown, and given to my horses and cows, who seemed as if they had a high treat.

The oats being got in, I ordered the field to be deep ploughed again, and then waited for a season of rain to begin my planting, which by my journal did not come till the fifteenth and sixteenth of September last; and the field being first well harrowed, we went to work the seventeenth, and continued planting till the twenty-ninth; nor can I now see any difference between those planted the seventeenth or twenty-ninth. Though I quite agree with the author of the essays, that it is best to plant sooner than I did, if possible; yet I must observe, that what may do for gardens, or small pieces of ground, will not do for fields. From the last week of August to the middle of September, seems to me a very proper time. But “filling each hole with water, making drills; half filling them with sea-sand or wood-ashes, and watering each plant,” as the author of the essays mentions, is an endless and very expensive work.

For my part, I kept my eye on Monf. Lullin's directions, as laid down in Mills's third volume, page 259. as to that part that relates to planting; but an illustrious correspondent of Mr Mills's, in Lincolnshire, having cautioned the public against planting on ridges, I must needs say I was fearful of the rain and frost myself, if planted in that manner, especially on light land; and therefore I ordered my field to be ploughed as level as possible, and made my man, after the field was ploughed, go three bouts on each side the furrows, so that, when harrowed a cross, you could hardly tell where they were.

The field being brought to this order, as I said before, we began to plant the seventeenth of September*: two men

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with

* In Scotland the best season for transplanting lucerne, is from the middle of April to the 10th of May; and should be done in a moist time; otherwise it ought to be well watered after transplanting — I have transplanted in September and in March, but most of the plants misgave; — those planted in April never failed. C.

with spades dug up the plants, and two women cut them: some care is certainly required in taking them up, but I did not find it great; it was done by common labourers. The women were ordered to cut the plants to about six or seven inches long in the root, and the tops to about two inches, as *Monf. Lullin* directs. They did it very handily: their method was to take them up one by one, (so that they could throw by the faulty ones), and when they had about a dozen in their hands, they cut them at top and bottom with one stroke of the knife at each end. Each had a washing-tub by her side, filled to about six inches with water: as they cut the plants, they set them in the tubs; and as they filled one tub, another was brought them*.

The method of planting is the same as for cabbages†: men who are used to work in gardens will do it very handily with a dibble or planting stick; but that mine might stand with all possible exactness, each man had a garden-line and reel: and as I think I shall be very able to keep them clean with *Monf. Lullin's* single cultivator, the rows are only twenty inches apart, and six inches in the lines. If I find a difficulty in keeping them clean in this method, then by drawing every other row, which may be done with great ease, my plants will stand at the distance directed by *Monf. Lullin*, of three feet four inches.

I was very impatient to see the effect transplanting would

* To such gentlemen as intend to transplant lucerne, I would recommend the beginning to take up and cut the day before they begin to plant; for I observed the plants received great benefit by standing all night in water.—Observing this method with my burnet-plants, when we begun upon them, I was surpris'd the next morning to find them all turned black; however, I ordered some of these plants to be used, but most of them failed. This served to confirm my opinion of burnet's preferring dry land. *MAGO.*

† It is very improper to use a dibble.—Open the ground, when the plant is to be set, with a spade; put the plant into the opening, and close the earth by hand well about it. *C.*

would have; and therefore, as soon as my plants in the seed-bed were about six inches high, I drew several, cut and transplanted them; and in the autumn, I took up these plants, and found they had all formed new tap-roots round the bottom of the piece (if I may so call it) planted, and instead of one, they had from five to thirteen new roots: this, you may suppose, gave me great pleasure, and convinced me that the illustrious Swifs was quite right.

The author of the *Essays*, I find, cut his plants with scissars: this must be very tedious work; and, with submission, I think he is quite wrong in cutting his plants to the length of nine or ten inches. Six or seven inches seems to me a much properer length; for the ground being dug or ploughed about twelve inches, the new roots will have five or six inches of well-loosened mold to strike into, which must be a great advantage to the plants; and if gravel, or a strong day, is near the surface, I am convinced mine, or rather Monsieur Lullin's, is the best method.

Yet this gentleman says, he cut his tap-roots too short, and knew not how to manage a root that was very small: in regard to the last, I must observe, that, if they were very small, I ordered them to be thrown away. So much has been said on the necessity of keeping lucerne in broadcast, drills, or transplanted, free from weeds, that I will say nothing on that subject.

At the same time that this gentleman so warmly recommends Mons. Lullin's method of cultivating lucerne by transplanting, he has, I fear, thrown a stumbling-block in the way of most gentlemen, and I think, every farmer; I mean his calculation of the expence: this therefore I must endeavour to remove.

When I began to cultivate lucerne in this manner, the only defect I could find in Mons. Lullin's account was, that he had not told the public how much ground they were to set apart for a nursery: this deficiency, however, I can supply to those who come after me; for sixteen rods will

will be about the quantity for an acre ; and then I think the expence of transplanting will stand as follows :

	<i>l.</i>	<i>s.</i>	<i>d.</i>
Digging, spit-deep, sixteen rods, at three-pence per rod	—	—	0 4 0
Seed, three pounds, at one shilling per pound	—	0	3 0
Weeding the nursery twice with the three-inch hand-hoe—(By sowing in this manner, transplanting will not be wanted ; nor do I think it proper, as they are to be transplanted again)—	—	0	3 0
Ploughing	—	—	0 10 0
Transplanting	—	—	1 5 0
Hand-hoeing the plantation once, the middle or latter end of October, in dry weather, which men used to hoeing turneps will do for three or four, but say	—	—	0 5 0
			2 10 0

This, I am persuaded, is the full expence of making the plantation ; yet the author of the essays has strangely worked it up to six pounds twelve shillings per acre : however, I readily submit this account to the inspection of every farmer and every gentleman in the kingdom, conversant in matters of this kind.

If the spring-ploughing for barley or oats has been nine or ten inches deep, then a ploughing in autumn of twelve inches will be sufficient, and cannot be charged at more than ten shillings. The trenching for the seed-beds may be done at leisure time ; so may the weeding of the nursery, and the hand hoeing of the plantation : then the real expence to the farmer will be only the seed and the transplanting, or one pound eight shillings per acre.

As to what this gentleman calls the yearly charges, I can by no means agree to them ; for the plantation having been weeded in October, will lie very safe and well till the latter end of February or beginning of March : then, in dry weather, it may be hand-hoed again, the expence of

of which has before been charged at five shillings per acre ; to which add four horse-hoeings after each cutting, at eleven shillings, which makes sixteen shillings per acre the annual charge*.

I cannot recollect any thing further that is necessary to be said on the subject of transplanted lucerne ; but as I would have every one, who writes to you on subjects of this sort, tell the truth, the whole truth, and nothing but the truth, so I think it but just to say a word or two on lucerne sown in broad-cast, or Mr Rocque's manner. I told you, in my former letter, I lived within a few miles of Mr Rocque ; and must add, that I have paid great attention to the culture and growth of lucerne and burnet for some years past ; so that I think I am pretty well acquainted with them.

The author of the *Essays* says, " If lucerne is sown " broad-cast with corn, no care can keep it clean : it may " last two years, only one crop being tolerable, and then " must perish in the common course of nature." And several of your correspondents are also of opinion it will never succeed in this method ; but I know it will ; for I have seen it cut three and four times. To cut it four times, the summer must be very favourable, and the last cutting will be late. Here I must remark, that lucerne is not only excellent as a green fodder, but as an early one, especially if sown in drills or transplanted ; for that sown in broad-cast will not be fit for cutting so soon as the former, by a fortnight or more ; however, the farmer may depend on three good crops in this manner of sowing.

In the spring, 1760, Mr Rocque sowed about five acres with lucerne and barley : the land is light and hot, but being in good heart, the barley was rank, which obliged him to mow it green, and sell it to a farmer for feeding cows, &c. Indeed I believe it will always be best to do so ; for the weeds, if there are any, are thus cut down,
and

* The expence for dung I leave the farmer to rate as he thinks proper. MACO.

and the lucerne thrives apace. The spring following, it may be harrowed with light harrows, and every year after with such harrows as you find clean it best. Last autumn, when the weather was hot and dry, I saw a farmer harrowing Rocque's field with large ox-harrows, and I do not perceive that it is at all hurt. The weeds and trumpery were raked up, and carted to a dunghill, with which he has this spring dressed his field, and it is now in a fine thriving condition.

Lucerne makes most excellent hay : horses are very fond of it, and with one quartern of oats, I will be bound, any gentleman will be well satisfied with the condition of his horses, even coach-horses ; nor do I see it is at all more difficult to be made into hay than clover.

Since I wrote my former letter, Mr Rocque has published, or rather republished, his account of lucerne. He has added some hints on burnet and timothy, which are thrown about in a very irregular manner.

I shall take the liberty to add a word or two on burnet ; but as to his bitter and dead earth, I confess I do not understand him. It is very refined indeed, and I think, from all I do know of this matter, he is out of his element. However, I think, we are pretty well agreed on the culture of burnet : for my part, I am convinced that dry land suits it best ; and though Mr Rocque has directed its being sown in April, May, or June, yet at the close of his pamphlet, page 55. he says it is best to sow it in August : he says, " Plough the land which you propose for burnet in the spring, and sow the seed in August ;" and adds, " It will grow all the winter : " This I know to be a fact, though the growth is then but small.

He admits the spring-sowing to be uncertain ; and I have found it so, unless you sow early, as the beginning or middle of March.

But though we agree thus far, I differ greatly with him when he says, that after the burnet has been threshed for seed " it makes excellent fodder." This I cannot admit ; for

I know it makes very bad fodder. I admit that his horse may pick here and there at the stack; but I know that, when put in their racks, few horses will touch it; and for a proof of this assertion, I could appeal to a certain noble Lord, a warm friend to every improvement in husbandry.

I do not say that neither horse or cow will eat it at all; I allow they will eat it; but so far from being excellent fodder, I say it is very indifferent, strong, coarse, ordinary fodder, and must be so in the nature of things; for burnet, when left to seed, grows very strong and sticky; but if cut in the month of May, when in bloom, it makes very fine hay: this method I therefore recommend to every gentleman and farmer; for by this means they may have two good crops of hay and good winter-feed; therefore, by no means let it run to seed, if you mean it for hay.

There are several things in Mr Rocque's hints on burnet that well deserve notice, particularly what he says of the horses at Lord Uxbridge's, that three acres would more than maintain six horses, and that on a very indifferent gravelly soil; ample encouragement for the cultivating burnet!

I have no practical knowledge of timothy, but have taken great pains to be informed of its virtues, and intend to cultivate it next year.

I am GENTLEMEN,

April 8.
1765.

Your most humble servant,

MAGO.

G R A S S E S.

MUSEUM RUSTICUM, Nov. 1764. No 73.

*An experienced Method of sowing Clover on Barley,
recommended to the Notice of Farmers.*

GENTLEMEN,

NOTHING is more frequently practised than sowing clover with spring-corn, and it is reckoned very good

good husbandry ; yet is it often the occasion of great loss to the farmer, nay, sometimes almost the entire loss of a barley crop.

A few years ago I sowed twenty five acres of land in fine tilth with broad clover and barley ; but the spring being backward and cold, and the summer wet, the clover got too forward, and overpowered the barley.

At harvest they were both cut together ; and the clover being full of juice, occasioned its being a long and tedious time before I could house my barley.

When I had got it into the barn, the men complained much of its threshing so badly, that they could not undertake to do it unless I would double the price to them : this I could not afford ; however, I ordered them to give it only a light beating, leaving the under corn in the straw, together with the clover, for my cattle.

I lost, in fact, half my crop by the clover ; and what barley I got was lean, and thin bodied, fetching me but a very indifferent price at market.

As I had before experienced several such losses, I was determined to find out, if possible, some remedy. I applied to a neighbour, a very intelligent man, who advised me to sow my clover, for the future, a month after my barley, and it would not prove too rank.

I followed his advice, and found it to answer extremely well, insomuch that I have, to my great advantage, continued the practice ever since.

There is no danger of the clover failing, though the season should prove dry ; and the seed is to be scattered on the ground without farther care, for there is no occasion to harrow or roll it : the roots and blades of the barley will keep moisture enough in the land to supply the small wants of the clover during its infant-growth, and when the barley is off, it will thrive amain.

I must advise the farmer to see that he has good seed ; and this he can know no other way but by trying it, by sowing some in his garden.

The method is very easy. Let him count off a certain number

number of seeds, suppose two hundred; and having prepared a bed, let these be scattered regularly on it.

He is then to observe how long they take coming up; and how many of the seeds miss; and by this he will be enabled to judge of the goodness of his clover-seed, and sow a quantity according to what the result of his experiment is.

I must note, however, that if the weather is very dry, it may be proper to shade the bed.

I am, GENTLEMEN,

Your humble servant,

Essex, 1764.

N. I.

G R A S S E S.

MUSEUM RUSTICUM, May 1764, No. 71.

A Letter to the Editors, respecting the making of Hay.

GENTLEMEN,

AS the hay-harvest is not at any great distance, permit me to say a few words on the subject of hay-making.

I have had, for these forty years past, a deal of experience in this matter; for which reason, what I say may, I think, be depended on.

In the first place, I do not hold it good to let grass stand too long before it is cut: the best time, in my opinion, to begin to mow, is when the plants begin to blossom. When they are in this state, it may naturally be supposed they have attained their largest growth, and are fullest of sap; therefore in a condition of making good, sweet, nourishing hay. If the plants are suffered to stand longer, till the seeds are perfected, the stalks grow hard, sticky, sapless, and chirky; and, of course, so great a quantity of nourishing juice cannot be concentrated in them.

The least dangerous way of making hay is by keeping it

U n

almost

almost all the time it is in the field, after mowing, in grafs-cocks, as we do in many parts of this large county. These cocks consist of about two or three forkfuls each, and are often turned, though very seldom spread, unless there is a certainty that no rain will fall till they can be made up again.

I know this method will be objected to, as being slow; but the sureness of it makes full amends: besides, the hay is better than that made in the common way, unless the weather happens to be very temperate and fine: if the weather is sultry, and the sun shines very hot, in the common way, the sap, or juices, of the plant evaporates too hastily, and the stalk becomes brittle, and contains no nourishment; and in rainy weather, in the common way, the hay is soon spoiled: on the contrary, in the way I recommend, viz. grafs-cocking, in rainy weather it does not take nearly so much damage, nay, none at all, unless the rain is heavy and of long continuance; and in the very hot sultry sun-shining weather, the sun has only power to dry to a proper degree, and hay the grafs, without evaporating too much of its juices, or making it brittle and heartless.

In the neighbourhood of London, the second crop, or aftermath, when made into hay, is of value; but in haying this crop, so as to make it sell well, there is great nicety. The nature of the aftermath-grafs is more soft, spongy, and porous, than the first growth: it is therefore more liable to be hurt by rain.

I have two ways of haying my aftermath. If I can, I get it in when the weather is fine, and in the middle of the day, after making it in grafs-cocks as above mentioned; and when this is the case, it assumes the colour of fine green tea, and is almost as fragrant; and these qualities recommend it at market. But if I find I cannot get it in so fine as I could wish, owing to the fickleness of the weather, I then take care to inn it before it is quite made; or, if it happens by any accident to be over dry, I cart it in the morning early, whilst it is yet damp with the dews, and stack it forthwith: I take, however, the precaution of making proper vents or

air-channels in different parts of the stack, lest it should suddenly fire: the hay stacked in this damp state is always mow-burnt, which I always intend it should be to a certain degree, as I am convinced, and so are many who purchase of me, that horses, in general, will thrive better on this hay than on that which is inned in the finest order. By this simple management a rainy hay-season does me less damage than most of my neighbours.

In the northern parts of this county, many are of the same opinion as I am in this respect, and chuse to have all the hay they intend for their own use mow-burnt; and their horses prefer it before any other, seemingly better, hay.

I have found it of great use to bestow a watering on my fields, by means of water-trunks, immediately after my first crop of hay is got off. This brings the plant forward, and makes the grass much sooner ready to cut than it would be, should this very inconsiderable expence be grudged: I call the expence inconsiderable, because, were not my horses employed in this work, after my first crop is inned, they would probably stand idle, unless I chose to send carts empty to London for dung, which I sometimes do.

I must, however, before I conclude, observe, that when I stack my hay undermade, with an intent that it should be mow-burnt, I am forced to watch it constantly, to see that it does not heat too much, so as either to rot or fire; and I easily know the state it is in, by first running my arm, as far as I can, into the stack, and afterwards a pole, or hedge-stake, a few feet long: if I find it inclinable to be too hot, I make more vents for the air, by thrusting it through the stack in various places; but if this remedy is not sufficient, and the weather is not rainy, I generally employ a number of hands, who unmake the stack and make it up again afresh: and this always answers, as it cannot settle so close as it did at first; therefore the cool air has a freer passage. I am,

GENTLEMEN,

Your humble servant,

Near Epping, Essex,

May 10. 1764.

A FARMER.

G R A S S E S.

G R A S S E S.

MUSEUM RUSTICUM, May 1765. No. 78.

A Method of preventing Hay, Barley, &c. from being Mow-burnt.

GENTLEMEN,

CAN there be a greater subject found than agriculture in all its branches, for laborious men to employ their industry, or men of genius their penetration? It is deservedly a national concern, and not unworthy even the patriot's care: and as your scheme, from the beginning, is so well calculated and pursued, especially for the improvement and pleasure of rural life, it is in some degree the duty of those thus situated to communicate, though it is your province to perpetuate or destroy.

As the smallest improvement in husbandry seems not by you to be neglected, I will therefore mention a very easy method (which probably may not so universally be known as the utility of it deserves) to prevent mow-burnt hay, burnet, barley, or indeed any other grain or fodder, collected together either in stacks, ricks, or bays of buildings; I mean, not being tied up in sheaves.

Mow-burnt hay, barley, &c. are well known; and when it happens to the latter, vegetation is almost, if not totally, destroyed thereby: though the physical causes are not my present attempt; that I refer, if desired, to the ingenious and learned.

Even in a tolerably good harvest, you frequently see a vapour as it were arise from the top of stacks, &c. which, if put together to damp, injures it to that degree, as sometimes even to take fire, as various instances too fatally have demonstrated.

To

To avoid it therefore, prepare a large sheaf, or two sheaves, of corn-straw, tied together*; and when you begin to make your stack, place the sheaves in the centre†: and as the stack gradually arises, so must also the sheaves, (or boltings, as they are in Shropshire frequently called), by which method a funnel, or chimney, as it were, will be continued from the bottom, so as to collect and draw up the circumjacent dampness, and discharge it at the top.

When the stack, &c. is thus finished, draw out your sheaves, (and, if out of doors), cover it with a bottle of straw, previous to the covering or thatching of it.

The benefit of this method, I know by experience, and many of my industrious neighbours know the same.

I have heretofore received damage from putting hastily quantities of hay, barley, &c. together; but by this easy precaution, (which does not take up any additional time at all), have avoided the inconvenience and disappointment arising from mow-burnt hay, barley, &c.

I make it a rule that my servants adhere to this method, even in good harvest-weather; for often the husbandman is tempted, in a fine day, to hurry too much. Hay-harvest will soon arrive; therefore I communicate this to you: and, should the honest and industrious farmer receive but the least benefit from what has been said, I have my reward.

Your correspondents should observe, when they write upon practical husbandry, to describe the nature and quality of the soil; for what can be more different than the management necessary to be pursued in cultivating a cold, moist, and perhaps clay land, from a good loamy mixed soil, or a dry sandy one?

Your

* A long narrow sack stuffed with straw, and a rope fastened to it to pull it up, is more convenient than sheaves. C.

† The same to be observed in any building when a body of hay, &c. is put together, so as to preserve a flew, or funnel, about three fourths of a yard in diameter; but that, in some degree, must be proportioned to the quantity so collected.

Your Berkshire gentleman was rather deficient in this, relative to his queries to make a lawn before his house, (the very business I am now engaged in): he should have been very particular also, how long the land had been in tillage, and how treated during that time.

But oats, gentlemen, are by no means so proper as barley to lay down a field to grass, especially when you sow Dutch, or any other clover; neither is rye-grass so good as well-chosen hay-seeds; for certainly rye-grass may almost be ranked as a species of couch-grass.

It is adviseable always to put a quantity of your best hay by itself; by which means I have generally a better sort of grass-seed to sow than is promiscuously collected from large quantities; and I have long wished Mr Stillingfleet's doctrine of grasses was more properly adopted; what would be more advantageous than for the society of arts to give a suitable premium, equal to the task, for gathering quantities of such grass-seeds as they should point out, and to be distinguished by well-dried specimens to as many as sent for them? for a drawing, even with a description, is often imperfect; as one acre of grass-ground, with proper seed laid down, would exceed nearly two in value; though, at the same time, I am no stranger how much proper management, good manure, and especially seasonable watering of lands, contribute to alter, in time, the very species of grass.

Writing is not a favourite employ of mine; but if any hints I happen to mention seem to promise advantage to the public, they are at your service; otherwise prudence, of course, will direct you to let them remain unnoticed.

I am GENTLEMEN,

Your humble servant,

Shropshire,
April 16. 1765.

F. R.

DAIRY.

D A I R Y.

FOREIGN ESSAYS, April 1765. Art. 31.

An Essay on the best Method of making Butter, on the Management of a Dairy, and salting Butter for keeping or Exportation. Written by Mr JORE, Secretary to the Society of Agriculture, established at Rouen in Normandy.

GENTLEMEN,

A Considerable trade for butter being carried on in France, not only for the supply of the great towns in the kingdom, but also for the use of the colonies, it is natural that we should contribute as much as possible to the perfection of this commodity ; and this subject appeared to be of so much the more importance, as Normandy is capable of supplying a very considerable quantity of the best butter, for it abounds with excellent pastures, which maintain a great number of milk-cows.

All the inhabitants of Normandy know the defects of the butter they make ; but few of them are sensible that these defects are less to be attributed to the quality of their milk, than to the manner in which they manage their dairies.

One single district is well skilled in this matter, and no other has benefited by its example in the course of a great number of years.

By adopting the method practised in the country of Bray, which I am now about to describe, our butter would be delicious and good at every season of the year, it would become a capital article of housewifery, as it would be proper for salting, and would keep for years together : by this means it might become an article of commerce, in preference to butter made in a different manner, and save
large

large sums of money to the kingdom, which are now sent abroad to purchase this commodity, though of an inferior quality.

Observations made at Merval, on the manner of making Butter in the Country of Bray.

THE milk is set in cellars arched over with brickwork, deep and cool, somewhat resembling such vaults as are best adapted to keeping wine in proper order. The temperature of the air in them in winter, as well as summer, is nearly from eight to ten degrees of M. Reaumur's thermometer. They are paved with ordinary tiles, or simply with bricks laid flat.

When there is any reason to apprehend the heat penetrating into the cellars, the vent-holes are stopped with straw during the heat of the day.

In winter they take care that the cold should not get into this cellar, by stopping the vent-holes in like manner in frosty weather.

The door to these cellars, and the vent-holes should be either on the north or west-side; the door is often within the dwelling-house, but always in a room where no fire is kept.

Neatness and cleanliness are so very essential in this cellar, that no wooden utensils, boards, &c. are suffered to be in it, because as these would soon rot in such a cool place, a disagreeable and musty smell would issue from them.

Not the least dirt is to be seen either on the roof, the edges of the air-holes, or on the floor; and in order to preserve this neatness, the pavement is frequently washed; and no-body comes in without putting on a pair of slippers, which stand ready at the door.

The persons who have the care of the dairy put them on there, first pulling off their ordinary shoes; the least smell, other than that of milk, which should be perceived in the dairy, would be thought to injure the quality of the butter,

butter, and would be attributed to the want of care in the maids.

Cleanliness is thought so extremely necessary towards the having good butter, that in Saxony and Bavaria, they rub and wash the cows before they milk them, if they happen to have laid down in the cow-house.

The keelers in which the new milk is put, are earthen dishes scalded in hot water, in order to get off the stale milk that may soaked into their substance. This stale milk is an invisible leaven, though well known, which sours the new milk. Constant experience has discovered this inconvenience. These dishes are fifteen inches wide at the top, six at the bottom, and six inches deep. These dimensions are from outside to outside; if they were deeper, it would be hurtful, if they were wider, it would be inconvenient.

The milk is brought from the pastures in the wooden pails or earthen pans, in which it was milked.

All copper vessels are esteemed dangerous to be used in a dairy. The milk is suffered to remain quiet about an hour on the dairy floor, till the froth is gone off, and the natural heat it had has quitted it. It is then poured into the dishes through a sieve, so that no cow-hairs or dirt may remain in it.

The dishes are set on the floor of the dairy, after it has been well cleaned; the coolness of the place communicates itself to the dishes, and prevents the milk from curdling; for every thing that is done in the dairy, is in order to hinder the milk from curdling and growing sour in summer before the cream is taken off; and in the winter to prevent the dairy from being so cold, as that the milk should be frozen, or that the butter should be with difficulty made, on account of the cream having been chilled.

The dishes being in this manner filled, are twenty-four hours, and sometimes less, on the dairy floor; they are then skimmed: they should not be left longer, because the cream would lose its sweetness, becoming thick, and

the milk under it might curdle and grow sour; and where this is the case, no good butter can be expected.

The skimming is performed in the following manner.

The maid gently raises the dish, laying the lip of it on a large pan, and with her finger's end she divides the cream near the lip of the dish, in such a manner, that the milk which is underneath, may be poured off into the great pan through this division, leaving the cream by itself in the dish.

All the dishes which were set at the same time, are in this manner at the same time emptied, and all the cream is put together in proper pans, in order to be churned at the appointed hour.

At the time of the year when it is necessary to milk the cows three times a day, this work is to be three times a day repeated, when the milk has been set in the dishes twenty-four hours.

It is necessary to observe, that the dishes being only six inches deep, the cream rises much sooner to the superficies, and is generally all risen in about eighteen or twenty hours, particularly when the coolness of the air in the dairy prevents the milk from curdling.

If the weather is tempestuous, very hot, or inclines to thunder, the cream rises a great pace, and the milk will quickly curdle and grow sour; but this must be prevented thus: As soon as the dairy-maid hears the thunder at a distance, she runs to the dairy, stops up the vent-holes, cools the pavement by throwing down some water, and then skims all the dishes wherein the cream has risen a little.

In some extraordinary cases, the cream rises in less than twelve hours.

When the milk is thus drawn off from beneath the cream by slooping the dishes, within the space of twenty-four hours at farthest, the butter-milk which is in the cream is not in the least sour, and the same may be said of the skimmed milk. This last being then a very thin liquid,

liquid, no part of it remains in the cream, so that there will be no danger of the cream souring in four or five days whilst it is kept in the dairy before it is churned.

They who are acquainted with the manner in which dairies are managed in upper and lower Normandy, may easily judge that their dishes, which are above as large again as those made use of in the country of Bray, cannot be cooled like these latter; that the custom they have of pouring the warm milk into them, absolutely defeats the intention of keeping them cool; that the cream cannot rise to the surface of these large dishes so quickly as to be taken off before the milk beneath is sour; that the custom of leaving these large dishes exposed to all varieties of heat and cold, though either may be in extreme, without taking the least care to guard against the natural bad smell, or dirtiness of the place, are still more opposite to what ought to be done; and finally, that to leave the milk to grow sour and curdle, skimming it only once in five, six, or even eight days, and sometimes more, are customs which tend to spoil both the milk and the cream, insomuch that no good consequences can result from them.

Common experience convinces us, that the acid parts destroy those which are more fat, and of greater substance, and that they give the consistence of soap to what they do not reduce to water; it is also well known in the country of Bray, that the cream taken off whilst it is light, new, and sweet, from milk that is also sweet, yields a larger quantity of butter, in proportion, than when it is taken off stale, from curded, sour, old milk; the butter in this last case is not only in smaller quantity, but it is more rank, cannot be kept fresh, and is by no means proper for salting, which is the principal object of this Essay.

I know several districts in the province (Normandy) where the butter is good and fine flavoured in spring and autumn, but rank and bad in summer, because the coolness of the spring and autumn has nearly the same effect on their dairies, as the inhabitants of the country of Bray industriously endeavour to cause the whole year round.

But

But when the summer advances, the sourness of the milk spoils the butter, and makes it of no value, though their pastures are excellent.

We may reasonably conclude, that if they had better management, they would not lose the advantages they might naturally expect from the fine weather of the summer, when the grass is infinitely better and more plentiful.

I know a farm, the chief profits of which arises from butter; this farm, when occupied by intelligent and sensible people, yielded butter which sold for the same price, as the best made in the country of Bray; the land, however, coming into the hands of a farmer who knew little of this matter, and whose wife was full fraught with the prepossessions she had made in the country of Caux, and which she exactly followed during the nine years of the lease, the butter made in that time was constantly sold for the worst sort, at a third part less price than his neighbours, and neither the remonstrances of the landlord, nor the loss she every week suffered, could ever persuade this woman to alter her method.

For eight years past, this same farm has been in the hands of a new tenant, an industrious intelligent man, who adopting good methods, the butter he made was immediately esteemed the best in the country, and is constantly sold at a price accordingly in the market at Gournay.

To this farmer am I obliged for the description of the management of a dairy which I am now giving.

This anecdote proves, that the advantage of this method, by no means depends on the soil, though it be ever so good.

All the milk that is skimmed, must immediately be taken out of the dairy, lest it should, in any way, injure the cream; but this latter is kept four or five days, or even a week, before it is churned; but it is at the same time to be observed, that the less time the cream is kept, the finer flavoured will be the butter that is made of it.

In extensive farms, where the quantity of cream is too large

large to be managed in common churns, they use a barrel-churn.

One of these consists of a barrel about three feet long, and two feet and one half in its largest diameter, the whole measured from out to out. On each head is an iron spindle, fastened on with a cross to the head, and on each spindle is a wench.

The spindles rest on a horse or stand, made on purpose, of such a height that the women may easily turn the churn.

The iron crosses by which the spindles are fastened to the heads of the barrel, prevent there being any necessity of an axis passing through it, as there must be no iron within side the barrel. The wenchs are made three feet long, that two, or even three people may work at each, when the quantity of butter in the churn requires it.

Within the barrel are two boards, fastened edgeways, one on each side the aperture hereafter mentioned, to the staves, and running the length of the barrel on that edge, but on the other edge they are chamfered off at the ends, in order to permit the liquid part to pass easily whilst the churn is turning.

One hundred pounds of butter at a time may be made in a churn of this size ; there are larger, and some on the contrary are less ; in other respects it is not much matter in what instruments the butter is made, provided there is no intermission in the making. The barrel-churn is used for greater expedition, where a large quantity of butter is made at a time, and any instrument that will accomplish this end may indiscriminately be made use of.

The cream being put into the churn, the aperture, which should be at least six inches wide, is to be closed with a plug, covered with linen dipped in a lye, which I shall describe by and by, and secured by an iron bar. Over the bar passes an iron pin, which being driven into two staples fastened to the barrel, makes every thing secure.

Four or six people turn the churn, till the butter is made, which will be in one hour in summer, but in winter will require several hours ; this work does not cost much,
for

for the farmer's maids are helped by some poor women in the neighbourhood, who have only a little butter-milk given them for their trouble.

It is very evident, that the motion of the churn continually agitates the cream, for every turn it falls twice from one board to the other, and they know when the butter is made, by its falling in a lump. The butter-milk is then drawn off through a hole about an inch diameter, on one side of the large aperture, which hole had, during the operation, been stopped by a wooden plug.

Through this hole, a pail of cold water is poured, by means of a funnel, and the plug being again put in, they continue turning the churn, to wash and cool the butter. This work is three times repeated, if they would have it well cleaned, and it is left several hours to cool in the last water, that it may be the firmer, if the weather is very hot.

When the butter is sufficiently cooled, the great plug is pulled out, and the butter is taken with the hand from the churn, in pieces of two or three pounds weight each, of which lumps of different weights are made, to fifty pounds, by heaping it in a cloth purposely dipped in lye.

The largest lumps are most esteemed, because they keep better in carriage.

They mark the lumps with wooden spoons, and notched sticks, in order to decorate them.

In winter, butter having no colour, the natural paleness of it is disagreeable to the seller, to the buyer, and much more so to the consumer.

They have discovered a method of giving it the colour that is natural to it in summer, without injuring the quality of the butter, or infecting it with any taste whatever.

They get a large quantity of marygold flowers; either double or single are equally good, provided they are fresh gathered.

These are put into a stone pot as fast as they are gathered, and being pressed down, the pot is covered and set into the dairy.

After

After some months, all these flowers are converted into a thick liquid of the colour of a marygold flower; this liquid they use in winter, to colour their butter; they mix a small quantity of it with some cream, which they put into the churn when they fill it.

Experience teaches them to put the necessary quantity, according to the fulness of the colour they would give the butter.

This colour is lasting; for the butter never loses it. Marygold flowers, which give it no bad quality, are known to be alexipharmic and sudorific; but the small quantity that is put into butter has no sensible effect.

Of the neatness and cleanliness required in making
BUTTER.

Butter is not only apt to stick to what is not very clean, but also to every thing that has been washed well, or even scalded with hot water, if it is not first rinsed with lye, made of fine ashes, or of Roman nettles bruised till they no longer sting; the last are generally used, and every time a pan, cloth, or other utensil, has been employed in the dairy, either for holding milk, cream, or butter, they should be rinsed in this lye before they are again used: and moreover, the mistress, who is generally the person that makes up the butter, and takes it out of the churn, is obliged to rub her hands and arms with this lye, or the butter would stick to them.

Of the Uses to which the Skimmed Milk, Butter-milk, &c. are applied.

The poorer kind of people drink the butter-milk, which is taken out of the churn, by way of food; they also make broth of it in the farmer's house for the men and maids, and moisten bran with it to feed the poultry, &c.

The

The skimmed milk they give to their calves, warm, mixing half water with it. This milk being very thin in body, as the more substantial and nourishing part is taken away from it, often gives the calves a weakness, of which several formerly died; but they are presently recovered, by letting them suckle their mothers, which soon restores them to their strength and vigour. This remedy is, however, expensive, as it deprives the farmer of the butter which would be produced by the cow's milk.

They say, that if the skimmed milk was half mixed with water, in which turneps, parsneps, or any sweet and nourishing roots had been boiled, the animals, so far from contracting a weakness, will grow fat, the juice of these plants in some sort supplying the place of the fat parts of the milk which are taken away.

I am of opinion, this method might, without any risk, be tried; but it is necessary to take notice to the country-people, that in general, they use copper-vessels to heat the milk which they give to their calves; the copper of these vessels deposits in this milk, which is naturally inclined to be sour, on account of its being deprived of its more oily parts, a corrosive quality capable of injuring young calves, and even killing them.

It would be much safer, if earthen vessels or iron pots were used, as these communicate no bad qualities.

As to such of the skimmed milk as the calves do not consume, it is curdled by art as speedily as possible, lest it should turn sour; ordinary cheeses are made of it, which are used in the farmer's own family, or sold to the poor; finally, the whey which is pressed out of these cheeses, with the skimmed milk that is not applied to this use, serves to feed the pigs withal.

Of the method of SALTING BUTTER.

Our endeavours should tend towards making butter fit for salting, as by that means it may become an object of commerce

commerce, either in the interior parts of the kingdom, the other countries of Europe ; or, finally, for the parts beyond the tropic.

The method we have described gives to butter the qualities necessary for its preservation ; but it must be salted enough to make it keep, which depends on the quality and the quantity of salt that is used, the vessels in which the salted butter is put, and some other circumstances.

The farmers, not being accustomed to sell their butter ready salted, they carry it to the markets of such towns where there is the greatest consumption : there every one buys the quantity of butter that is necessary for his family. The buyer distinguishes that which has the qualities of the butter made in the country of Bray, from that made in the manner of the county of Caux ; he sets a value on one and rejects the other, which is spent fresh in the neighbourhood where it is made.

Butter should be salted as speedily as possible, every delay being prejudicial. It is several times to be washed till the water is no longer discoloured. Grey or bay salt should be used, and not white salt, which is not esteemed good for preserving any thing.

The bay-salt is to be dried in an oven and bruised ; the washed butter being then spread out, an ounce of the dried and bruised salt should be sprinkled on for every pound of butter : it should then be kneaded till the salt and butter are well incorporated together.

The salted butter is afterwards put down into stone crocks or jars of various forms. The jars should first be scalded with boiling water, to get out the stale butter which soaks into the pores of the earth of which they are made ; they are then to be rinsed with lye, in the manner above prescribed for the dairy-utensils.

These jars hold from twenty to thirty pounds ; the salted butter is to be pressed down in the jars, and they are to be filled within two inches of the top, after which they are to remain quiet for seven or eight days.

In this time the salted butter detaches itself from the jar by shrinking in its size, and leaves between it and the jar

a space about a line wide, into which the air would insinuate itself, and spoil the butter, if it was suffered to remain in that state.

In order to prevent this a brine is prepared, made of salt and common water, which must be strong enough to bear an egg, as there would be danger in making it too weak.

This brine being settled, the clear part is drawn off, and is poured on the salted butter, so as to introduce itself into the vacant space between the butter and the jar, and thence expel the air as fast as it gains admittance; for this purpose it is poured on by little and little, gently moving the jar, till the brine is at least an inch above the butter. The air cannot, after this is done, approach it on any side, unless the butter floats in the brine. In this case a weight must be laid on it, in order to sink it, and thereby prevent the air from causing it to decay.

This is the method of salting butter, which we practise all the year round at Rouen: it is used in the best families, and serves to make pastry, which the most delicate palates cannot but approve of.

All butter salted in this manner, and put down in stone jars, with a sufficient quantity of brine, will be equally good with that of the country of Bray, which we have described; for the keeping well of the butter depends on its not having been injured by the acidity of the sour milk, and on the jar being made of good earth, and its being well scalded and rinsed, as we have recommended, with the lye, so as not to communicate any bad quality to the butter.

When this commodity is to be carried to any distance, the brine cannot be kept in the jars; to supply the place of it therefore, they cover the butter with salt to the thickness of an inch.

This method does very well, provided the butter is not long without brine; insomuch that butter, properly made, and which, after being salted, is carried into the several parts of Normandy, and even to Paris, if brine is but put on it when it comes there, will be very good.

But this will not do for butter intended for exportation or ships of provisions. It is very difficult to flow any considerable

siderable number of jars, on account of their being subject to break ; hence came the custom of putting up butter in firkins or tubs : but whether it is put into firkins or jars it is impossible to keep it covered with brine if the ship passes the tropic.

In order to remedy these inconveniences it will be proper to season the wood of which the butter-tubs are made, to keep it from shrinking, and from the fermentation to which it is subject in hot climates, when the tubs are greatly heated in the hold, at which time the sap ouses from the wood, mixes with the butter, and makes it rank, notwithstanding it has been well salted. The same fermentation also lessening the volume of the staves, the brine runs out, and the butter is soon spoiled.

It is not impossible to find a remedy for this, and to do it would certainly be of infinite use, as it would probably be a means of making all sorts of sea-provisions keep better, which would greatly contribute to preserving the life and health of sailors, an object of no small importance.

In order to preserve butter on shipboard, it should be well put down in jars, shaped like a frustrated cone the base uppermost, or rather like a perfect cone, the base uppermost, out of which the butter might easily be taken in a single lump.

The lump of butter being covered on the out-side with salt, and then pressed down into its jar, might in this condition do without brine, because the jars resting on the point of the cone, the lump of butter would sink towards the bottom as fast as the size of it might be lessened by the heat of the hold ; by this means there would never be any vacant space, except on the top, which should be covered with salt.

Wooden tubs might be made in the same form, so as to answer the same purpose, provided the wood they were made of was well seasoned ; but the greatest pity is, that these tuns could not be conveniently stowed in a hold.

In general, the pasturage of the greatest part of Normandy seems to surpass that of the country of Bray, if we may be permitted to judge by the nature of the soil, and the dung that is left by grazing animals.

If any means could be discovered, by some encouragements

ments given, of introducing a good method of making butter into such parts as now make so wretchedly bad, the salt butter which comes to Rouen from Isigny, and other parts of Normandy, would not be entirely abandoned to the consumption of the poor.

If this was the case, we may presume, that butter would become a capital object in commerce greatly to the advantage of those who possess extensive pastures; for even at this time there is not a cow but what brings forty shillings clear profit to its owner, after all expences are paid, putting entirely out of the question the great increase of profit that might be expected from dealing in butter of a superior quality, fattening calves, and even the cows.

It is well known, that fattening oxen does not bring so large a profit to the graziers by far; whence we may conclude, that it would be very advantageous to farmers if they kept more milk-cows.

This advantage would subsist till the quantity of butter made was in proportion to the demand; and even afterwards it would always continue a capital branch in agriculture, as it would keep us from the necessity we now are under of purchasing such quantities of foreign butter.

I have been by so many persons requested to write this essay, and by such as are seemingly eager to adopt the methods prescribed in it, that I am in hopes its utility will in time be felt, not only by the dairy-man, but also by the farmer and the land-owner.

CATTLE and SHEEP.

MUSEUM RUSTICUM, Jan. 1765. No 6.

*Some Remarks on stabbing Cattle hoed with Clover,
with a Word or two on Barnet.*

GENTLEMEN,

THOUGH I am very well inclined to your undertaking in general, and think that the various improvements in husbandry cannot be too soon, or too universally,

fally, communicated to the industrious husbandman, you will not take it ill if I remark, that your collection of papers has some conjectures, which, in my opinion, must rather puzzle than help the plain country-farmer.

Among these, give me leave to single out a correspondent, who comes with his glyster-pipe, and his drugs boiled in three quarts of water till they come to two; that is, he is two or three hours in preparing a medicine for a malady, which, to my certain knowledge, kills in seven or eight minutes.

This distemper, if I mistake not, is owing to the quantity of air-bubbles taken down with the clover, which, being dilated by the heat of the stomach, swell it so immoderately, that it leaves no room either for the lungs to play, or for the heart to expand; so that an absolute stagnation ensues.

That this is the case, I think evident; for while the beast is swelling, it is very uneasy and restless; but as soon as ever it falls, there is instantaneously an end of all motion and struggling; and though you then stab, or try what experiment you please, the beast is irrecoverably gone.

That these air-bubbles are no chimera, may be seen any warm, dewy, May morning, where, upon the edges of the leaves of every sprig of clover, you may, with the naked eye, behold, as it were, a fringe of small balls, resembling the globules of quick-silver: these, as the heat of the day increases, are further expanded, and rise up in a vapour, till the grass is quite dry.

As oxen and cows never chew their meat, but crop it with the tongue, and swallow it directly, it is easy to conceive how these air-bubbles should be conveyed into the paunch, unbroken*.

If

* It may be, perhaps, objected, that if globules of air-bubbles are visible to the naked eye on clover, why do not we see them, when farther dilated, rising visibly in the air in little bubbles, nearly as big as peas?

I answer, that the ascent of vapour is not so effected. Look

in

If you ask, why clover should be more subject to generate air than any other grafs; I answer, that it does not, but that latter-math is as subject to do so as clover; but as latter-math is of a more tender texture, it purges off without inconvenience, as in the case mentioned by your correspondent, where a glyster was given; whereas the large stalks * of the clover are not so easy to pass away.

The distemper thus known, the remedy is obvious, namely, stabbing; and I have seen this operation performed on ten cows together, without the least danger or inconvenience.

It

in a grafs-field in a dewy morning, and you will there distinctly find these small bubbles, so filled with air, which are, in fact, specifically lighter than the circumambient air: on this account they are all mounted on the very tip of the spiry grafs, whence they escape in bubbles, were it not for the attraction from the grafs, with which they are in contact.

Accordingly, if you examine them minutely, their shape is not spherical, but like a pear with the stalk downwards: their specific levity buoys them up; their attraction, at the point of contact, draws them down in the shape above mentioned. In the mean time, the sun acting on the included air, it is so far rarefied, that the outward watery case is made so thin, that it tears, or breaks, at the point, where the grafs, by its attraction, holds it: on this, the outward air rushes in: the bubble, being broke into infinite small particles, disappears with a sensible elastic snap.

The smaller parts are driven upwards, both by their specific levity, and by the direction of the outward air, which, breaking in at bottom, must push them upwards. The larger parts return down to the ground, where probably the same operation is repeated till all the grafs is dry.

* On the making the incision, I have known the large stalks of the clover lie a-cross the wound; and they have been drawn out through it, undigested, in pretty large quantities; but this I think a wrong practice; the use of stabbing is merely to let out the air; that being done, the digestion will go on of itself, if you let it alone.

It is to be done on the left side, about three inches from the hip bone, and two inches below it.

The reason why the wound is to be made on the left side will be obvious, upon the mere inspection of the first book of anatomy which you have at hand, where you will see that the stomach can in no other place be easily come at.

As to the size of the wound, I think it not material, it being peculiar to the flesh of cows, or oxen, to heal very easily, and never to fester *.

As to the knife, it is not at all material whether it be pointed or not; the sharper the better, as the incision will more easily be made; but the size of the paunch, I will warrant it, will put it very far out of the power of the knife to reach the intestines. However, it may not be improper to gauge the knife at about an inch and half, or two inches long.

There is one caution necessary, and that is, not to stab lower than an inch or two below the hip-bone; for the excrement always, more or less, works out at the hole; and if you make it low in the paunch, that, with the weight of the excrement, will prevent the closing of the wound, which is unseemly, but not dangerous; for I have known a cow or bullock killed, with the hole not closed, from the above mistake, and die exceeding good meat; which fact, if it should appear never so marvellous to you, is yet true: and if you will look into Dr Cheselden's Treatise

* This is, perhaps, owing to their very cool and simple diet; perhaps too, to the amazing thickness of the hide, which granulates in healing in a very particular manner, never, that I know of, forming any pus.

Sure it is, that of twenty beasts, which I have seen stabbed, none did amiss, though the excrement poured out of the wound continually. They healed at last without any stitching or plaister; nor were they housed at all, but for the first night after the operation.

tise of Anatomy, second edition, page 136. you will find a case, exactly similar to this, in a human body *.

I cannot close this letter without a word or two upon burnet, of which so much is said in your collection.

As we live in a country lately inclosed, every inch of our land has been looked over and valued by the best judges we could fix upon, in order to ascertain the value of each man's property, both before and after the said inclosure.

Now, it is a general rule, that where-ever this burnet grew, (and we have great quantities of it), that land, of course, was of the lowest quality.

As to the plants keeping long green, and its early appearance of fine pasture in the spring, this is owing to a pungent oil, with which it abounds, the warmth of which is a preservative from the frosts : but that same oil is also the cause that none of our cattle are fond of the hay made of it : they will eat it greedily for a day or two, while they are tempted by the novelty of the taste ; but soon after, it heats their mouths, and they will eat straw rather than it.

This is so true, that where-ever the horses belonging to the army are quartered in these parts, the officers are very watchful not to be tricked by the inn-keeper with that hay wherein there is burnet. We give it our cows at the beginning of the year ; but they will not eat it at all after Christmas, when it gets dry ; or, if they do, it makes them lousy.

The truth is, we have borrowed all these fine notions of improvements by artificial grasses from France and Switzerland, where winter-fodder is hardly to be had at all, and they, of course, are put to their shifts ; but that

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* The case mentioned by Cheselden was this. " I was
" called to a poor women with a mortification in the *abdomen*.
" I cut away the small gut that was mortified, so far as could
" not be saved : then I stitched the sound part of the gut to
" a sound part of the wound near the navel : to this it after-
" wards adhered, and the woman recovered, and voided her
" excrement that way, without any notable inconvenience."

is no reason why we, who are under no such necessity, should do the like.

I am informed, by undoubted authority, that at Geneva, which borders upon both these places, they give their horses ashen faggots, made of the tenderest branches, which they eat all winter very greedily : but I shall leave it to you, gentlemen, whether this should be a reason why a visionary projector should recommend the same thing to the English grazier.

I am, GENTLEMEN,

Your very humble servant,

Warwickshire, Southam,

P. H.

December 1. 1764.

CATTLE and SHEEP.

MUSEUM RUSTICUM Dec. 1764, No. 90.

Method of Stabbing hoven Cattle, with Cautions on the Subject.

GENTLEMEN,

AS many of your correspondents, as well as yourselves, are desirous of knowing the particular methods of stabbing hoven beasts, give me leave to communicate to you what I know relative to it, as it came under my own eye and hand.

Some few years ago, a neighbour of mine had a bullock under the distemper, and never seeing any thing of the kind before, he came to me for my advice : the ox was so bad and blown up, he could not stand, I had somewhere read of this operation, but never had seen it per-

Z z

formed :

formed ; however, upon this occasion, seeing the absolute necessity for some kind of relief, I turned operator myself.

I took a sharp-pointed pen-knife, and fixing my eye on the most prominent part of his belly, thrust the blade through the integuments quite into the abdomen: there issued out a great gust of wind very fetid, with some water of a redish colour: the bullock seemed easier, but far from well ; for the wound presently closed up, and admitted no more air to escape ; so that I was under the necessity of stabbing him twice more in different parts of the belly, before he was thoroughly relieved, which, by the help of a glyster after the last stab, was presently brought about: and here give me leave, gentlemen, before I leave this subject, to give a few cautions to those who may be under the necessity, one time or other, of performing this very useful operation: reflection and experience warrant me in them, therefore I shall freely proceed.

First then, if it be performed with a pen-knife, not to be fearful in pushing in the blade a proper length, till you find wind issue out ; for if the wind be in the cavity of the belly, you cannot possibly hurt the gut, the whole body of the wind being between you and it, which no reasonable bladed pen knife can touch ; and if the wind should be pent up in the intestine, you must penetrate it before the beast can be relieved. To this last perhaps it may be objected, that we run the hazard of killing the beast by wounding the gut ; but I am far from thinking so, as I have seen many wounds of the intestine, both in man and beast, very happily cured : yet granting there might be some danger in it, still we are certain, if the poor beast can get no relief, it must die ; and so circumstanced, surely, gentlemen, a doubtful remedy is better than none at all.

Another caution is, that where these wounds are made in the belly with a proper pen-knife, it is not adviseable to have them sown up ; for where there is a continual motion or action, as there is in the muscles of the belly and parts adjacent, such a practice is not only unwarrantable, but
cruel;

cruel; and why should we not behave with humanity to the brute species, as well as any other?

My last caution and advice is, that upon all these occasions, when the beast is relieved of his wind, a proper glyster should be thrown on immediately, as hot as he can bear it: these glysters strangely relieve them, by acting as a warm, comforting bath to their distempered bowels, and emptying the same of the load of muck within them. I have more to say on this subject, which I doubt not in the least will meet with general approbation, as it intirely tends to make this operation safe and easy; but unexpected company prevents me communicating it to you at present.

I remain, GENTLEMEN,

Isle of Ely,
Dec. 15. 1764.

Your usual well-wisher, &c.
G. B.

CATTLE and SHEEP.

MUSEUM RUSTICUM, May 1765, No. 79.

Caution respecting the Management of Lambs in Snowy Weather.

GENTLEMEN,

I Have often heard it said, that we should profit by our misfortunes: this I have frequently done, particularly on the occasion I am about to mention.

I am but a young farmer, and, of course, have been, by my inexperience, led into many mistakes.

A few years ago I bought five score lambs, with an intent to keep them for store-sheep. I turned them on my lands, where they did very well till the weather happened to be snowy.

As soon as the snow had covered the ground, I began to be alarmed, lest my lambs should be starved, and accordingly ordered one of my men to carry some sweet hay,
and

and lay it in different parts of the field for them to eat : but in this I did very wrong ; for the snow was not yet so deep, but that the lambs could, by scraping with their feet, clear it away, and get at a little grass. This made them refuse the hay, to which they took a distaste : and as more snow afterwards fell, I lost that year no less than thirty-eight lambs by downright hunger, and the rest were with great difficulty saved ; for I was obliged to try many methods of teaching them to eat the hay.

I drew a little twisted hay a-cross their mouths ; but this, though a common method, had very little effect. I then rubbed some hay till it was soft and silky, putting it into their mouths, and holding them shut : this, indeed, taught a few to eat it, but not many. At last I was obliged to buy half a score old sheep, for which I paid a good price, and turn them in amongst my lambs. As the sheep eat the hay fast enough, the lambs soon followed the example ; and by this means I saved above half my stock.

My over-caution was the occasion of my loss ; for, had I left the lambs, without giving them any hay, till the snow had been deep, and they had been pinched with hunger, they would have taken readily enough to eating of hay.

As my loss was considerable, it dwelt on my memory, and I took care never to make the like mistake again ; in consequence of which care I have always of late years met with success in the lambs I have since bought.

I am sensible, that many of your readers will think that I might as well have saved myself the trouble of writing, as to have sent you a matter of such small consequence ; but I hope you, gentlemen, are of a different opinion, as you cannot but be sensible, that by inserting such cautions in your useful work you will do infinite service to young farmers.

I should take it as a particular favour, if some of your ingenious correspondents would inform me in what manner I can best manage a field of fourteen acres on my estate, which has been many years laid down in natural grass. It is but an indifferent pasture : I have therefore thoughts
of

of ploughing it up; but my neighbours dissuade me, because on the south and west sides it is bounded by a wood, and they say that half my crop of corn would be devoured by birds; besides, that my wheat crops would be hurt by the north-easterly winds, to which the field is fully exposed. The soil is a thin coat of light loam, over a bed of hard gravel; and at the depth of about six feet is a bed of stiff clay, which runs deeper than I have yet searched. The grass of this field is very apt to be burnt up in a dry summer, and in a wet season does not yield so good a crop as one would naturally expect.

I am, GENTLEMEN,

Herts,
Jan. 1. 1765.

Your constant reader,

A. S.

CATTLE and SHEEP.

MUSEUM RUSTICUM, April 1764. No. 37.

A Letter to Mr Robert Davis, on the best Method of fattening Pigs.

S I R,

A Letter in the Museum Rusticum, relative to some pigs being put up to fatten, induces me to convey a piece of intelligence relative to the feed of these creatures, that ought to be more publicly known than it is at present.

Put two chotes * of the same litter and weight in different sties for fattening; give each the same quantity of peas, meal, or whatever food it be; make no difference but in the quantity of water given. Suppose, for instance, dame's pig has a gallon a day, and mine but two quarts, or in proportion to a larger quantity: dame's pig will be considerably

* A common word in Essex, &c. meaning store pigs that are in tolerable proof, and fit to put up to barley meal or peas.

derably the fattest and heaviest, but mine will be the best and firmest meat *. Great quantities of liquids extend the vessels of both man and beast ; and a due, but not over, proportion of water is a necessary consideration for those who would have good bacon or pork.

It is a vulgar saying, that hogs delight in dirt : they do so ; but the hog that is kept clean, and feeds cleanest, is the wholesomest and best meat. I am,

Sir Your's.

C A R R I A G E S.

MUSEUM RUSTICUM, May 1765, No. 81.

To the Editors of the MUSEUM RUSTICUM.

GENTLEMEN,

I Beg the favour of you to insert in your work the following letter, which last night appeared in the St James's Chronicle, and will, I dare say, be acceptable to all your readers.

Your's, &c.

April 21. 1765.

A. M.

An improvement on the Broad-wheeled Waggon.

AS I understand that some thing is in agitation at present concerning the act relating to broad-wheel waggons, I beg leave to communicate what I saw to day, which seems to be a very great, though a very simple improvement,

* We are greatly obliged to the gentleman who sent this hint, as many country-dames have formed an opinion, that the less water a pig has that is put up to fatten, the sooner it is fit for the knife. R.

ment, and which I should hope, when known, would soon be followed.

I saw a waggon passing through Highgate, the fore-wheels of which were about six inches wider asunder than the usual distance, and the hind-wheels, on the contrary, were about eight inches nearer each other; the consequence of which was, that the waggon-tracks, instead of nine inches, were full sixteen; and by having made the hind-wheels run eight inches nearer than usual, the track was just of a proper breadth for post-chaises and all quartering carriages to run in: the fore axle-tree being somewhat wider than usual (as abovesaid) was advantageous in turning, as the wheels did not touch the lock so soon by three inches as in other waggons. If the act ordered all waggons to be constructed on this principle, the great inconvenience observed in some of the northern and western roads would be effectually removed, where, from the perverseness of the surveyors, who lay heaps of stones, and other obstructions, on each side the roads, in order to force all carriages to go in one track, the ruts, which are inevitably made by this management, being but nine inches, are too narrow to afford a good horse-path, and the two tracks or ruts too wide asunder to suit coaches or chaises—which sets all the country, and all travellers, (who do not give themselves the trouble to examine nicely into the matter), in an uproar against the broad-wheel waggons; but, if this improvement becomes general, it will be a certain cure for the ignorance of some, and the malice of others; for in six months it would remove all the evils complained of, in spite of every thing that their bigotry could contrive against broad-wheels for the future.

Totteridge,
April 16.

B. W.

C A R I A G E S.

C A R R I A G E S.

MUSEUM RUSTICUM, Apr. 1765, No. 59.

General Thoughts on Roads and Wheel-Carriages.

GENTLEMEN,

AS the thoughts we here send you have been a part of our amusements in various avocations from family-business, if you conceive them worth the attention of the public, you are at liberty to insert them in your work.

Introductory Definitions.

THAT we may be understood, in what we write on the subject, we hope the candid will allow us the following leading principles, or maxims, without searching for, or even expecting a perfect style or elegance of expression.

I. That all carriages go easier down hill than on level ground, easier on level ground than up hill, and harder up hill, as the sine of the angle of ascent, (or nearly so), till the angle becomes about 20° .; or till the perpendicular ascent may be about one third of the base line, at which time no power can be said to draw a load up the same smooth, hard plane that itself may stand upon*.

II. That sandy roads (and such sort of fine gravel as may be considered as next a-kin to sand) are, generally speaking, the most pleasant and best roads we have. But, tho' in general they may be so, yet that meaning is far from being universal; for it seldom happens that the roads under the

* By smooth and hard, is meant such a condition as a mason may be supposed to leave the face of a stone in from his ax or chissel, or when the common roads are in their hardest and smoothest condition.

the general idea of sandy roads will bear much work in long, continued, gentle rains; therefore such roads must have breadth, in proportion to the work they are expected to bear, which must ever be at the discretion of him or them who have the directing power.

III. That pavements can never be considered as commodious roads, though often to be preferred in particular places and cases.

IV. That wash-roads (however applauded by some) are rarely without notorious exceptions; though, in particular places, they too may be useful and necessary.

V. That roads whose surfaces are chiefly composed of hard, rough gravel, replete with loose pebbles, (or other irregular large stones), though they may be comparatively good in dirty seasons, cannot be esteemed the most eligible roads, whether considered under saddles, traces, or wheels.

VI. That broad wheels wear out roads, and themselves, much less than narrow ones; and, (*ceteris paribus*), in drying seasons, even consolidate the surface of roads. This is not only demonstrable by the established laws of mechanics, but, we presume, sufficiently proved by the last ten years experience on the great roads round the metropolis for about an hundred miles distance; but we apprehend, as there are many intervening roads, that it doth not yet amount to half the carriage of the kingdom.

VII. That great inconveniences arise from the present manner of using broad wheels, viz. by their making the ruts or tracks too narrow and irregular at the bottoms for horses to travel in; for though this inconveniency may, in some measure, vanish near London, and in other great turnpike-roads, which may have obtained a majority of broad wheels, by means of saddle-horses, drift cattle, with coaches, chaises, and a perpetual attendance of labourers, supplied by large tolls; yet is it an extraordinary grievance amongst farmers, (especially those of small farms in cross roads), and where the country proves clay, marl, or rich, or spongy soil, and but thinly peopled; and yet much wheel-carriage necessary, and no turn-pike; as near large

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and heavy manufactories, and mines of coal, lime, lead, &c. ; for when the ruts get any considerable depth, the cattle are often thrown down, and in general lamed by insensible degrees from the uneasy form of the path they are obliged to travel in ; for that the broad and narrow going both in the **same ruts** is intolerable to the broad ones, as well with respect to the ruts for the wheels, as the paths for the cattle to walk in ; and where they have not that small relief by the difference of tolls, (or even where they have), we humbly conceive may yet claim some farther notice and assistance from legislative wisdom, to extend that mode of preserving roads, by means of broad wheels, to the utmost verge of Great-Britain, as it must be allowed the best and most general project ever yet practised in the kingdom for that purpose.

VIII. That to remedy the impediment arising from the present way of using broad wheels, is a province for a superior wisdom and authority *.

Nor can we help wishing to be indulged with a sight of our humble opinion in print, (conceived so long since as the year 1755, and propagated amongst our associates †), which, in plain truth, amounts to little more than the finding a means to have one axle, of all four-wheeled carriages, longer than the other ; so that the inner distance of the head of one pair of wheels be less than the outward distance of the other, at least two feet, or perhaps two feet two, four, or six inches ; and then it would be less material what breadth the wheels themselves were of, so that their tread be flat ; or if one pair were two or three times the breadth of the other, provided the whole breadth of the four wheels be at least two feet, or other legal breadth, and the tract made by such waggon twelve, thirteen,

* Yet a certain method is humbly hoped from the well-collected opinion of the whole kingdom in parliament assembled.

† And hinted in a ludicrous petition to the Editors of the Gentleman's Magazine, but was never touched by the press that we know of.

thirteen, fourteen, or fifteen inches broad, (and words can explain such liberty without danger of litigious confusion).

If carts were to have the distance of theirs, either equal to the greatest, or least tread of the waggons, it would generally help to preserve and commodore the roads, and the horses path, and would have its use to different and particular people and neighbourhoods—Query, If not better to have carts with broad wheels go only in the middle of the waggon-track, or other difference in the tolls or number of cattle drawing? Perhaps no more than two, if under an augmented breadth.

IX. That the attrition, or friction, between the common wood axles and the boxes of the wheels, is not more than one sixteenth of the whole draught *. The projector of a late project, under the affected and pompous epithet of Friction Annihilated, having allowed, and rationally proved, that his project could never amount to more than about half a horse in a team of eight; and though that projector had flattered himself that his project came as near the total preclusion of that friction as the nature of things would admit; yet was he forced to acknowledge too, that his invention, when applied to carriages, must have some allowance further for its own weight, which might be considered as goods to be carried for nought,

Though this impediment of weight is a very material one in the iron arms now in use, it is amply compensated by oil instead of greasing, and the possibility of drawing greater loads than wood could bear without firing, or retarding the speed of business.

X. But there is another sort of friction, or rubbing, relating to wheel carriages, of much higher import than that of the axis, especially in the narrow wheels, which is, their rubbing against the sides of the ruts when they get of any considerable depth; which must happen from various

* But the attrition, or rubbing of the sides of the wheels in deep ruts and rough stoney roads, is indefinitely more,

rious causes; as, first, whenever a wheel follows another thinner than itself, if both happen to tread so as to go exactly in the same tract, this friction will be on both sides of the following wheel, before it can touch the bottom of the rut made by its forerunner: hence the edges of new wheels wear off much faster than the edges of old ones; and if tread a small matter wider, or narrower, the impediment is greatly increased, which impediment frequently happens from the imperfection of workmen; a circumstance not to be avoided.

Whenever the bottoms of the ruts, and of narrow wheels especially, are composed of large rough stones, some will get more on one side and some on the other, as on rough pavements, but generally much worse in common roads, though less conspicuous: the wheels are perpetually rising and falling from one stone to another, not only from the summit to the pit-hole immediately before it, but when the edge of the wheel happens a little beside the crown of the stone, probably slides side-ways off such stone, with a forcible shock, into the collateral depression; whilst every such slip wears off something from the wheel, something from the stoney road, and some labour from the cattle drawing such load; and at every such slip the very stone from which the wheel hath slipped rises more or less in proportion to the shock, till at length that very stone is worn out, or forced above ground, from whence probably it falls again under the pursuing wheels, as if on purpose to be ground to an impalpable powder, by the most facile means that art can contrive, and from whence wind or water conveys it into one of their own fluid elements.

XI. That the sort of friction, rubbing, or grinding, from the edges or sides of thin wheels, is much greater than in the broad ones.

Hence, it is presumed, the broad ones must last longer in proportion to the expence, and require less power to draw them with the same load.

XII. That high wheels will always travel easier than low ones,

ones, till their own weight becomes an incumbrance, equal to the difficulty of surmounting obstacles by their shorter radii.

Now, we apprehend, this incumbrance of the weight of wheels only will increase nearly as the squares of their diameters: hence, a wheel of double the height would have quadruple the weight; one of three times the height, nine times the weight, &c. but it may likewise be observed, that though the small wheels are capable of bearing the same trial of strength as the large ones at first, yet certainly the large ones must be presumed to wear longer, as the points that must come in contact with the road, to wear them out, are less frequent in proportion as the lineal dimensions only (being of the same breadth) where they tread the earth.

We apprehend too, that mechanics and experience will nearly coincide in the proof, that wheels for carriages, to be drawn by horses, and made of such timber as England most aptly produces for the purposes of heavy loads, will be found to be somewhere between four and six feet diameter.

XIII. That the expence of similar wheels may be considered nearly in proportion as their weights. Lower wheels, however, might be more useful if the roads were more even in their general surface; but the difficulty of surmounting the common obstacles of roads must prevail, for some time at least, against very low wheels.

N B. The weight of wheels is not quite so pernicious as if the same lay in any other part of the carriage, or in the goods to be carried; but the difference is no more than that they add no friction in their boxes, which (by No. IX.) is only one sixteenth part; and that they, in some measure, prevent the overturning of high loads, by keeping the centre of gravity of the whole something lower than it would be if the wheels were lighter.

It is observed, that gentlemen of speculative faculties, and those who practise the carrying business, generally disagree in positing the goods in the waggon.

The former prove by their art, (experimentally), that
the

the load draws the easiest when the heaviest part lies upon the hinder (as the larger) wheels.

But as these accurate experiments, and their conclusions, are generally drawn from regular plains, it is presumed that they frequently over-look that great advantage arising from the strength of the thill-horses when exerted in lifting the low wheels out of their hole, which may be more than equivalent to the height of the hinder wheels; but this being an undeterminable point, may be fruitlessly contested for ever.

Though a late author, (Mr Bourne), notwithstanding the ill success of his public experiment near London, has certainly merited greatly of mankind by his new invented waggon, and his treatise wrote on the subject of roads in general; yet it is much to be feared that several objections must arise in practice, which he was not at that time aware of.

As first, it is presumed that the lowness of his wheels are too far in the extreme, if he is not really mistaken in his reasoning upon their surmounting of obstacles, which may often be struck or driven before the wheels with a sliding motion before they can mount the summit of such obstacles: in which case the wheels of two or three times the height would have greatly the advantage.

This great cylindric length would likewise have the same kind of impediment, in every turning, as the conic wheels would in going strait forward, as he has rightly observed.

Though a certain condition of roads may, in particular times and places, allow a preference to his method; yet these small, long cylinders can scarcely ever be universally advantageous.

If the load be pretty high, and most over the two wheels that are nearest together, it will often endanger the overturning, as may be conceived from a stool or table standing on three feet.

Yet what Mr Bourne has said upon roads in general may
be

be worth legislative notice, however varied for simplicity's sake.

LEADING QUESTIONS.

MUSEUM RUSTICUM, Sept. 1763, No. II.

To the Editors of the MUSEUM RUSTICUM.

GENTLEMEN,

ON reading your proposals, I determined to become your correspondent; but it took me up some time to consider what should be the particular subject of my letter.

This may probably be the case with many others: I therefore concluded, that a few hours of my time would be well employed in removing this difficulty.

For this purpose, I herewith send you some leading questions, as I call them, for the use of your correspondents. They relate chiefly to agriculture, and will serve to guide many, who may be inclined to write to you, in the choice of a subject. I owe these questions, most of them at least, to a foreign tract.

Your humble servant,

Sept. 3. 1763.

N. K.

Leading Questions in AGRICULTURE.

Of Waste and Uncultivated lands.

1. What quantity of uncultivated land is there in each of the several counties of England?
2. Is none of this land fit for tillage, and what is it worth an acre?
3. Might not such as is not proper for tillage be profitably planted with timber?
4. What use is made of the mosses, morasses, or bogs, in the several parts of the kingdom where they are to be found;

found; and might not some machines be invented to lessen the expence of draining these bogs?

5. Which is the best method of bringing a drained bog into tillage, and what crops is it best at first to sow on it? What trees or plants thrive best in a moist situation?

6. Which is the best method of planting timber trees, as oak, elm, ash, firs, pines, &c. and what culture do they require to forward their growth?

7. Which is the most profitable method of felling brush-wood, under-wood, or spray; and at how many years growth should the different kinds in different soils be cut?

8. Which is the best method of cultivating timber for house and ship building, and which is the best season and manner of felling the trees?

9. By what cheap means can wood, particularly fir, be rendered less combustible; and may it not by some preparation be preserved from decay and worms?

10. Which is the best method of inclosing woods?

Of Cultivated Lands.

1. What is the common price of plowed land, pasture, meadow, and wood land, in the several parts of the kingdom?

2. What crops of wheat on an acre do the lands, on an average, bear in the several counties?

Of Meadows and Pastures.

1. Which is the best method of managing up-land pastures?

2. How are the several kinds of artificial pastures to be cultivated to the best advantage; and what kinds succeed best in the several sorts of soil? Which are easiest dried and made into hay for winter-fodder; and what has been the result of several experiments made on this subject, under the various circumstances of soil, situation? &c.

3. Might not tares or grey peas be to advantage sown, to use either as green or dry fodder?

4. Which

4. Which is the best method of flooding meadows ?
5. How are low meadows to be managed, and which is the best method of improving them ?
6. Which is the best method of preserving the grass, and destroying the weeds, in meadows and pastures ?
7. In what manner are rough meadows and pastures best levelled ?
8. What are the several methods of making hay, and which is the best ?
9. What form is best for barns or hay-stacks ?
10. In what manner can our winter and summer fodder be increased ; and how are we to guard against its bad qualities ?
11. Which is the most profitable method in different circumstances of using fodder, green or dry ?
12. What is the best manure for meadows and pastures ; and at what season, and in what manner, is it to be laid on ?

Of Lands in Tillage.

1. What is there peculiar in the methods of husbandry practised in each county ?
2. Should not the land be in general plowed oftener and deeper ?
3. In what proportion should the different kinds of manure be laid on various soils ; and what manure is best adapted to each soil ?

At what season, and in what manner, should manures be spread ?

Which is the best method of collecting and preparing natural manures ?

What effects have the different kinds of artificial manures, as ashes, foot, tanners bark, rags, pot-ash, &c. had on various soils ; and what is the expence of making use of them ?

When land is to be prepared for wheat, is it not a good practice to so tares or buck wheat, and plow them in, when in full sap, as a manure ?

4. Is burn-baiting or denshiring land of any use ; and which is the cheapest way of doing it ?

5. What composts are best adapted to each soil ?

6. Which are, in the several parts of the kingdom, the best times for sowing the winter and spring corn ? What method of sowing has succeeded best on various soils ? At what depth is it best to lay the seed under the different circumstances of soil, situation ? &c.

7. In what parts are drill plows used in England, and with what success ?

8. Which is the best method of preparing seed-wheat ?

9. What sorts of grain are best adapted to the several soils and situations ?

10. What is the best order of sowing the several kinds of grain in the same land ?

11. Which is the best method of clearing our lands from weeds ?

12. What are the precautions necessary to be taken in weeding wheat ?

13. What remedies are best adapted to the distempers of wheat before it spindles ?

14. What is the proportion, in the several counties, of the crops of grain, one sort compared with the others ; and what is the proportion betwixt the prices of them ?

15. What have been the crops of any particular field for any number of years successively ?

16. Which is the most advantageous method of cutting and getting in grain at harvest ?

17. What preparation does corn require in order to its being preserved for a length of time ?

18. What construction is best for a granary, so as to keep corn in a small compass, and without danger ?

In what manner can corn be best guarded against the ravages of insects ? &c.

19. What precautions are necessary to prevent our corn from degenerating, so as to have good seed corn ? Is it best to buy the choicest at the markets, or to chuse the most perfect our own crops can yield ?

20. Are

20. Are there not some kinds of foreign grain, but little cultivated with us, that might to advantage be propagated in England, such as the Smyrna wheat, the bere or square barley? &c. Would not even rice grow in some parts of the west of England?

Of Flax and Hemp.

1. Which is the best method of preparing land for flax or hemp; and might not the husbandry of these plants be improved?

2. What manure agrees best with these plants?

3. What proportion does the value of the crops bear to the expences of husbandry? &c.

4. What is the best time of sowing flax, or hemp, in the several parts of Great-Britain and Ireland?

5. In what manner should these plants be managed whilst on the land?

6. What care is required in the pulling them; and should not hemp be pulled at two seasons, according to its sex?

7. What is the best method of dressing flax and hemp for the various purposes for which they are used?

8. In what manner could the culture of these useful plants be best encouraged?

9. Is it not best to sow foreign flax-seed?

Of Hedges and Fences.

1. Which is the most useful, convenient, lasting, and cheap fence?

2. Would not ditches only in some cases do?

3. Which is the best and speediest method of raising a good quick fence; and how are they best cut, plashed, and kept in order?

Of the Implements of Agriculture.

1. What are the different sorts of implements and utensils employed in the works of husbandry in each county?

2. What

2. What is the best form of borers to discover the quality and depth of the soil? &c.

3. What kind of instrument is most useful for raising the turf of land, in order to its being burnt?

4. What are the best forms of plows, harrows, and other common instruments, regard being had to the soil they are to cultivate?

5. Might not new instruments be invented, or brought into use?

6. What proportions and constructions are best for carts, waggons, tumbrils, &c. used in carrying dung, gravel, earth, corn, or fodder?

7. In what manner might the drill-plow, by being made less complicated, be brought into general use?

Of Country-Labour.

1. What is the price of the several kinds of labour in the several parts of the kingdom, by the day or the piece, proper regard being had to the distinctions of age, sex, strength, and abilities of the labourers, and the seasons of the year?

What alterations have there been in this matter, and owing to what causes?

2. In what manner might children of different ages be most profitably employed, so as not to hurt their growth and future health?

3. What wages are given, in the several parts of England, to plowmen, threshers, team-men, labourers, and household country-servants?

4. At what times in every county are the several works in farming performed, such as sowing, plowing, manuring? &c.

5. In what order should these works be performed, so as to be at the least expence of time and money?

Of Cattle.

What is the best form of stables, cow-houses, ox-stalls, covered sheep-pens, &c. regard being had to the convenience of situation, with respect to the dwelling-house, &c. the saving trouble in attendance, the health of the cattle, the saving the dung? &c. &c.

Of Horses.

1. In what manner could the breed of our horses, in some parts of the kingdom, be best improved?

2. How are the farmers to be prevented from spoiling young horses by putting them too soon to the collar?

3. What kind of fodder is best adapted to draught-horses?

4. To what particular disorders are horses subject in the several counties; and what are the causes of, and remedies for them?

5. What kind of geer or harness is best for draught-horses, so that they may use their strength to the greatest advantage?

6. In what manner should young horses be fed and trained to exercise, regard being had to what work they are intended for?

Of Oxen.

1. Might not our breed of black cattle in some counties be improved?

2. What is the proper age to put oxen to work?

3. What fodder is most proper to feed or fat them with; and which is the best and cheapest method of doing it?

4. In what manner can they be yoked, so as to use their strength to the greatest advantage?

5. What distempers are oxen usually subject to in the several counties, and what are their causes and remedies?

6. In what cases are horses or oxen to be preferred one to the other?

7. What

7. What number of horses or oxen are commonly put to one plow in different soils?

Of Cows.

1. How much milk do cows generally give in different places at a meal?
2. In what manner are cows managed at the different seasons of the year?
3. What kind of fodder makes them give the best milk, and most in quantity?
4. What are the distempers of cows, their causes and remedies?
5. In what manner is butter and cheese made in the several counties of England?
6. Have the farmers of Suffolk and Cambridgeshire any thing peculiar in their method of making butter?
7. Have the farmers of Cheshire, Gloucestershire, Warwickshire, Lancashire, or Somersetshire, any peculiar way of making their respective sorts of cheese?
8. What is the common price of those cheeses at the first hand, and at what fairs are they sold?
9. Might not some at least of these cheeses be improved?

Of Sheep, Goats, and Hogs.

1. Of what kind are the sheep bred in the several counties?
2. What kind of pastures agree best with sheep?
3. What are their distempers, the causes of them, and their remedies?
4. Is not folding them on arable land a good custom?
5. What is the best winter-fodder for them?
6. Which is the best method of shearing them?
7. Under what restrictions may goats be admitted in a farm?
8. How is the greatest advantage to be made of the wool and goat's hair?

9. In

9. In what manner are hogs fed and fatted to the greatest advantage?

10. Under what restrictions may they be permitted to graze in the fields?

11. Might not some foreign breeds be with advantage introduced?

Of the Poultry-Yard.

1. Which is the best method of breeding, feeding, and fattening fowls, turkeys, ducks, geese? &c.

2. Might not artificial ways of hatching fowls be with advantage practised?

3. What are the distempers of poultry, the causes of them, and their remedies?

4. How is the greatest advantage to be made of their feathers?

Of Fish.

1. Which is the best method of making fish-ponds, either for breeding or feeding?

2. In what manner might the fish in our rivers be better preserved and increased?

3. How can the poaching in the ponds and rivers be best prevented?

Of Bees.

1. Might not the number of bee-hives be to advantage increased in many places?

2. Which is the best form for bee-hives?

3. What is the proper management of an apiary; and what is the best exposure for the hives?

4. How is the greatest advantage to be made of the honey and wax?

Of

Of Silk Worms.

1. In what part of his Majesty's dominions will white mulberry-trees thrive best? Have any experiments been made, and what has been the result of them?
2. What quantity of leaves have they produced in proportion to the extent of the plantation?
3. Which is the best method of planting mulberry-trees in different countries?
4. Might not some other plant be found out fit to feed silk-worms, at least for a time?
5. Which is the best method of breeding and feeding silk-worms? What are their distempers, the causes of them, and their respective remedies?

LEADING QUESTIONS.

MUSEUM RUSTICUM, Oct. 1763, No. 27.

For the Editors of the MUSEUM RUSTICUM.

GENTLEMEN,

I Perceive you have given the leading questions I sent you some time ago, a place in your first publication. It is this has induced me to send you some more questions, which will, I hope, be as well adapted to your plan as the last set were.

I have only to tell you, that I like what I have seen of your work, and am

Oct. 14. 1763.

Your humble servant,

N. K.

Leading Questions in Natural History and
AGRICULTURE.

*Of the Nature of the Soil, and the internal Produce
of the Earth.*

1. Of what nature, in the several parts of these islands, are the beds of earth immediately under the surface?

2. Of

2. Of what nature are the beds of the rocks, in what direction do they lie, and what are their varieties?

3. In what places are the several kinds of marle found, at what depth, what are their qualities, and to what uses are they applied?

4. Where is there the greatest plenty of gravel, for mending the roads, and curing damp cold soils?

5. Do we not sometimes find under the surface a different kind of earth, proper to serve as a manure to the soil?

6. In what manner can the nature of land be judged of by the plants it produces, and by their vigour?

7. In what places is fullers-earth dug, and where is it most pure and free from extraneous mixture? Might it not be found in places little thought to produce it?

8. Where is the best brick and tile earth to be found, and what is its nature?

9. What are the component parts of the several kinds of cultivated and uncultivated earths, of ochres and mineral earths?

10. Of what nature is the earth in the neighbourhood of mineral springs and mines?

11. What is the nature of the several mineral waters and salt-springs?

12. In what parts of these islands are coal mines found, and what is the nature of the coal in the several districts?

13. What is the nature of our bogs, marshes, and bottoms? how were they formed? whence proceeds the water with which they are filled? is it stagnant, and on what account? do we find turf in these bogs, and at what depth?

14. In what districts are our mines, minerals, sulphurs, marcasites, &c. found? of what nature as they, and in what quantity?

15. Where are our iron mines situated, and what is the nature of the ore? Where are our lead and copper mines, and of what nature are they?

16. What are the properties of the several springs of water?

water? To what causes can it be assigned, that certain springs ebb and flow periodically?

17. Might we not find marble in these islands, of a fine colour, and susceptible of a good polish? Could we find the gypsum for making fine plaster, lime-stone, free-stone, coarse marble, and sand-stones, what are their respective properties? Might not we find mill-stone quarries equal to those called French stones? Where are crystals, spars, &c. to be met with?

Of the external Produce of the Earth.

1. What are the indigenous plants of these islands?
2. What plants are most valuable for pastures? What noxious plants grow in our fields?
3. What plants are best adapted to form artificial pastures on the several kinds of soil?
4. What are the weeds which are most troublesome in our fields, and how may they best be destroyed?
5. Could not we grow larger quantities of woad, madder, and other plants fit for dyers use?
6. At what season do the several plants, natives or inhabitants of these islands, flower, and perfect their seed?
7. What sorts of shrubs are most plentiful; and what trees, or shrubs, will yield leaves that are most proper to serve as fodder for cattle, or to increase our manures?
8. What are the several kinds of timber that are found in our woods and forests? Might not firs, pines, and larch-trees be to advantage planted?
9. What soil and situation is best adapted to each kind of timber-tree, and to what distempers is each kind subject?

Of Animals, Game, and Birds.

1. What mischievous animals have we in these islands, and what are the best methods of destroying them?
2. Is game any where in such plenty as to be any considerable detriment to the farmers; and how are the small birds that infest wheat fields, &c. best driven away?
3. What

3. What birds of passage frequent this country? which of them breed here, and at what seasons do they come?

4. Would not the climate of some parts of these islands agree with some foreign animals, which are not mischievous, but which produce the fine furs? Might there not be a means of importing such from Canada, now it is in our possession? Would they not do well in the north of Scotland?

5. Has the air of this country any effect on our breed of domestic animals?

6. What kinds of fish have we in our meres and rivers, and on the several coasts? Which of them are held in the greatest estimation? At what time do they respectively spawn? What fish have we which come in periodical shoals, and which are best for salting, drying, or otherwise preserving to keep?

Of the most noxious Insects.

1. What are the most noxious insects of this country, and which are those which have, as it were, stated returns?

2. When are they most numerous, and what circumstances are most favourable to their increase? &c.

3. What are the insects which breed on particular plants, and which feed on them?

4. What kinds are noxious to corn and grass, and what are they which chiefly attack the woods?

5. What are the best methods of either destroying them, of lessening the damage done by them, or preventing them from injuring our crops.

DIFFERENT

DIFFERENT ADMEASURE- MENTS of LAND.

MUSEUM RUSTICUM, Dec. 1763, No. 73.

*A Letter to the Editors, from Mr John Irwin, on the
different Admeasurements of Land, in Ireland, Eng-
land, and France.*

GENTLEMEN,

I AM much obliged to one of your correspondents for rectifying my oversight with regard to the proportion between the English and Irish acre, or rather of reminding me to set myself right.

If he reads the paragraph again, he may perceive it to amount to no more than a defect (caused through hurry) in the manner of expression, which possibly might have often happened to himself; for *humanum est errare*.

I am sorry he did not favour us with his name, (unless it would diffuse a blush over his modesty), that we might know to whom we are indebted for this correction; as also the proportion between the two acres in square feet, which would be of more general use to the landholder.

However, since this gentleman hath reminded me of the neglect in my former letter, I will endeavour to amend it in this, and in such an extensive manner as I hope will prove both useful and instructing, especially to the lower and less-informed farmer.

Proportion between the English and Irish Acre stated.

The English acre contains

160 square poles, which at 16½ feet, long measure, each
pole, make 43560 square feet.

160

160 poles, at $5\frac{1}{2}$ yards each, long measure, make 4840 square yards in the acre.

The Irish acre contains

160 square poles, or perches, which, at 21 feet, long measure each, make 70560 square feet.

160 Do. which at 7 yards, long measure each, make 7840 square yards.

The Irish acre exceeds the English in square feet 27000
 ——— ——— ——— ——— in square yards 3000

There is also another English statute perch or pole, used in the admeasurement of woods, which is 18 feet, or 6 yards, long measure.

Besides these statute-measures, there are in England what may be called *customary perches*, differing one from the other in length in various counties.

In Staffordshire the customary perch is twenty-four feet.—In the forest of Sherwood twenty-one; the foot there being eighteen inches; the measure whereof is marked in the chancel wall of Edwynston, and in the church of St Mary in Nottingham.

In Herefordshire the perch of walling is sixteen feet and a half; a perch of ditching twenty one feet, &c.—The geometrical perch is ten feet, being the same measure that was in use among the old Romans.

As I have proceeded thus far in giving the different admeasurements of land in England, and as it is now become so much the fashion to read French books on the subject of husbandry, I shall, from a very eminent writer of that nation, give some account of the French arpent, or acre, as varying in size in different provinces.

The small arpent in use about Paris contains one hundred square perches, each perch being eighteen feet long; so that the arpent consists of 32,400 royal feet.

The middling arpent, in use in *L'Isle de France*, contains also one hundred square perches, but this perch is twenty royal feet long. The arpent therefore here consists of 40,000 royal feet.

The great arpent, as fixed by the ordonnance made for the
 duc

due government of the king's royalties on the waters, and in his forests, and on that account called the *royal measure*, contains in like manner one hundred perches; but this perch is still longer than that last mentioned, being twenty-two royal feet; so that the arpent, royal measure, contains 48,400 feet.

The *acre*, properly so called in a part of Normandy, contains one hundred and sixty square perches, the perch the same length as the last; so that this Norman acre consists of 77,440 square feet.

The journal * in use about Bourdeaux, containing 888 square toises, or French fathoms, is divided into three *pougnérées*. The *pougnérée* contains seventy-two *escas*, 10,656 square royal feet, or 296 square toises, or fathoms. The *esca* is twelve feet two inches long.

The journal used about St Dizier in Champagne, contains eighty square perches, each perch twenty-two royal feet long.

The *septérée* of Clermont-Farrand contains 800 square toises or fathoms. The journal of Lorrain consists of 250 square toises, each toise being ten Lorrain feet long, equal to eight feet nine inches and ten lines, royal Paris measure.

As in the above account mention is frequently made of the Paris royal foot, it may not be amiss to mention the proportion it bears to the English foot, which being divided into 1000 parts, the Paris royal foot will be 1068, and the Lorrain foot 958 of those parts; or the Paris foot being supposed to contain 1440 parts, the English will be 1350, the Paris royal foot exceeding the English by about seven lines and a half. The French, like us, divide their foot into twelve inches, and the inch into twelve lines. The geometrical

* The journal is so called from the French word *jour*, a day, and signifies a day's work, or such a quantity of land as a yoke of oxen may be supposed to plow in a day. N.

metrical foot contains ten digits, and the digit ten lines, &c.

I am, GENTLEMEN,

Your very humble servant,

London, Dec. 4. 1763.

JOHN IRWIN.

P. S. We must not omit to observe, that the perch, pole or rod of land, is in some places called a *Lug*. In many places, among the old farmers, the acre of land is estimated by the proportion of seed used for sowing it; by which means of course it varies according to the fertility or poverty of the soil. The Welsh acre usually contains two English acres. An acreme of land is ten acres. The fourth part of an acre or a rood of ground is, in some parts of England, called a *farding land*, or *farundale* of land.

Lateral Pressure of WATER.

MUSEUM RUSTICUM, May 1765, No. 76.

To the Editors of the MUSEUM RUSTICUM.

GENTLEMEN,

THE inclosed curious paper, which I take this occasion of transmitting to you, may amuse and inform your readers: for this reason I send it, that you may publish it for their use.

I am, GENTLEMEN,

Your humble servant,

Y. Z.

A Table, shewing the lateral Pressure of Water, from one to twenty Feet deep, in Proportion, and in Pounds Averdupoise, according to Mr Perry, who stopped Dagenham Breach.

I.	II.	III.	IV.	V.
Depth of Water	The weight of water against one foot, being one, the weight at each foot beneath will be as under.	The weight of water against one foot being one, the weight against any number of feet will be as under.	The lateral pressure against each foot in pounds averdupoise is as under.	The same against any number of feet, not exceeding twenty, is as under.
1	1	1	32	32
2	3	4	96	128
3	5	9	160	288
4	7	16	224	512
5	9	25	288	800
6	11	36	352	1152
7	13	49	416	1568
8	15	64	480	2048
9	17	81	544	2592
10	19	100	608	3200
11	21	121	672	3872
12	23	144	736	4608
13	25	169	800	5408
14	27	196	864	6272
15	29	225	928	7200
16	31	256	992	8192
17	33	289	1056	9248
18	35	324	1120	10368
19	37	361	1184	11552
20	39	400	1248	12800

Note, This table supposeth the lateral and perpendicular pressure to be equal, and that a cubical foot of water weighs sixty-four pounds, averdupoise.

lb. oz.

At Barking, in Essex, in 1763, the cubic foot of dry brick-work was found to weigh

Of wet ditto	102 0
Of rammed clay	104 0
Of river water	113 0
Of Portland stone	63 12
	141 8

of the like weight.

E X P L A.

E X P L A N A T I O N.

The table is twofold, shewing the lateral pressure of water, first in proportion, and secondly in pounds averdupoise; and this not only against any number of feet taken together, but also against each particular foot; and consists of five columns.

I. Column the first, denotes the depth of water from one to twenty feet.

II. Column the second, how much more, or what proportion the pressure against each foot beneath or under one, bears to that against one.

III. Column the third, what proportion the pressure against any number of feet, to twenty, bears to the pressure against one.

IV. Column the fourth, what the weight of the pressure against each foot is in pounds averdupoise, *i. e.* one foot wide.

V. Column the fifth, what the weight of the pressure of water against any number of feet, to twenty, in depth, and one in width, is in the same weight.

Note, The depth of water multiplied by two, less one, gives Col. II. The depth of water, multiplied by itself, gives Col. III. Col. II. multiplied by thirty-two, gives Col. IV. Col. III. by thirty-two, gives Col. V.

E X A M P L E S.

I. What proportion doth the pressure against the tenth foot in depth, bear to that against the first foot in depth? Ten multiplied by two, less one, is nineteen: therefore it is nineteen times as much. See Col. II. against 310.

II. What proportion doth the whole pressure of water, nineteen feet deep, bear to the pressure against one foot deep? Nineteen multiplied by nineteen, gives three hundred and sixty-one; therefore the proportion is as three hundred and sixty-one to one. See Column III. against 19.

D d d

III. The

III. The weight of the lateral pressure of water against one foot wide and one foot deep being found, or allowed to be thirty-two pounds avordupoise, what is the weight of the pressure of water against the tenth foot in depth? Col. II. shews the proportion to be as nineteen to one; therefore nineteen, multiplied by thirty-two, gives six hundred and eight pounds. See Col. IV. against 10.

IV. What is the whole weight of the lateral pressure of water twelve feet deep, and one foot wide? Col. III. shews the proportion to be as one hundred and forty-four to one; therefore one hundred and forty-four, multiplied by thirty-two, gives four thousand six hundred and eight pounds. See Col. V. against 12.

U S E.

The chief use of the foregoing table is to compare the weight of the materials of which any bank or bridge is composed, or by which the flood-gates of any sluice are supported, with the weight of the lateral pressure of the water against them.

General Observations about Banks.

I. The foundation must be so secured, that the water cannot get under it.

II. The materials must be so compact, and of such a texture, that the water cannot get between or through them.

III. And then, where the materials of a bank are found equal to, or to exceed ever so little, the weight or pressure of water, and are placed in such form that every part of the bank is equal to the weight or pressure against it, it will restrain the water within due bounds, provided it hath no current, is at rest, and not agitated by the wind.

IV. All banks must be made of sufficient strength to resist the weight of the water, not only when at rest, but also when agitated by the wind, and the shocks of the waves

waves or surges ; and be so defended by breast-work, where these are frequent and the current strong, that they may not be liable to be washed away by either ; for which purpose, brick, stone, wood, chalk, and fascines, or bavons, are used ; and in some places the bank is set back, and a large fore-land left, which is planted with willows or reeds.

V. It is hardly possible a bank should be so situated as to have only or barely the pressure of water to support ; and the weakest of those we have would be found, on inquiry, five times stronger than would be necessary for that end only.

General Observations about Bridges.

I. and II. The same as banks.

III. To place them, if possible, in such part of the river, that the opening may be equal to, or exceed the opening of the river below.

IV. If this cannot be done, an allowance should be made for the contraction of the stream by the piers, by laying the foundation deeper in the ground, and lowering the bed of the river between the piers, equal to the space they take up.

V. The ground, under and between the piers and abutments, must be so secured and made firm, by piles, frames, and aprons, that no springs or floods can disturb it ; and these works, next the stream, should project beyond the piers, and finish under the ground, or bed of the river.

VI. The piers, to the common high-water mark at least, should be pointed, to give the current of water an oblique direction, and break its force.

VII. The openings of the arches should rise higher than the highest flood was ever known to rise, and above the adjoining causeway, where a bridge is built in low grounds, to the end that in sudden floods the bridge may be eased, by the water flowing over the said causeway. But where a bridge is built in a hollow way, or between two hills, the road adjoining thereto must regulate the height ; which
may

may be managed by raising the piers, and making the arches, either in the old Gothic way, like a mitre, or semicircular, or elliptic ; each of which, if built with such materials as will not crush, and properly disposed against sufficient abutments, secured as above, will support any weight.

It hath been said that an elliptic is not equally strong as a semicircular arch :—of the same opening, it is not ;—but it is equally strong as, and, if properly constructed, possibly stronger than, a semicircular arch of such opening as the upper segment thereof would describe. An elliptic is a segment of a semicircle supported at the haunches, as many of the Gothic arches are semicircles supported in the middle, and the outer lines of every two of such arches, if continued, would describe a semicircle.

VIII. The width of the bridge must be, in regard to the traffic, of such dimensions as that one or more carriages may pass at a time ;—in regard to the water, of such dimensions, that the earth, &c. that is, the whole weight of the bridge, may be more than equal to the greatest pressure of water as will, in all probability, ever come against it ; which, if it is constructed on the foregoing principle, except upon the breaking of a frost in great rivers, can scarcely ever equal the pressure against a common sea bank.

General Observations as to Sluices,

They must be laid so low that the water, in issuing out below, may go directly into the water, without any fall ; and in their situation, opening, and building, as to the foundation and flank walls, be managed and guarded, in all respects, like bridges.

Done in the year 1763.

SOCIETY'S

SOCIETY'S PREMIUMS.

MUSEUM RUSTICUM, May 1765, No. 90.

*An Account of the Premiums offered this Year (1765)
by the Society for the Encouragement of Arts, Ma-
nufactures, and Commerce.*

For PLANTING and HUSBANDRY.

1. ACORNS. **F**OR planting or sowing the greatest quantity of land with acorns (twenty acres at least) between the twentieth of September, 1764, and the first of May, 1765, and for fencing and preserving the same effectually, in order to raise timber; a gold medal.—Certificates of sowing, agreeable to the above conditions, (and that there are five hundred oak plants at least on each acre) must be delivered to the Society on or before the first Tuesday in November, 1765.

2. For the second greatest quantity of land sown with acorns (not less than fifteen acres) agreeable to the above conditions; a silver medal.

3. For the third, (not less than ten acres), a silver medal.

4. 5. 6. The like premiums, and on the same conditions, will be given for planting or sowing acorns between the twentieth of September, 1765, and the first of May, 1766.—Certificates to be delivered on or before the first Tuesday in November, 1766.

7. CHESNUTS. For sowing the greatest quantity of land with Spanish chesnuts, (for raising timber), not less than six acres, before the first day of May, 1765, and for effectually fencing and preserving the same; a gold medal.

8 For the second greatest quantity, (not less than four acres), a silver medal.

9. For the third greatest quantity, (not less than two acres), a silver medal.—Certificates of having planted, agreeable

agreeable to the above-mentioned articles, must be delivered to the Society, on or before the first Tuesday in November, 1765.

10. 11. 12. The like premiums, and on the same conditions, will be given for sowing Spanish chefnuts before the first of May, 1766.—Certificates of sowing, agreeable to the above conditions, (and that there are five hundred Spanish chefnut-plants at least on each acre) must be delivered to the Society, on or before the first Tuesday in November, 1766.

13. ELM. For properly planting the greatest number of the small-leaved English elm, for raising timber, (commonly used for keels of ships and water-works), not less than one thousand, before the first day of May, 1765, and for effectually fencing and preserving the same; a gold medal.

14. For the second greatest number, in like manner; a silver medal.

15. For the third, a silver medal.—Certificates of having planted, agreeable to the above-mentioned articles, must be delivered to the Society, on or before the first Tuesday in November, 1765.

16. 17. 18. The like premiums, and on the same conditions, will be given for properly planting the small-leaved English elm before the first of May, 1766.—Certificates to be delivered on or before the first Tuesday in November, 1766.

19. FIR. For planting out in the year 1765, at proper distances, the greatest number of that pine, commonly called the Scotch fir, (being the tree which produces the best red or yellow deal), not less than twenty thousand; to be two years old at least when planted out; and for effectually fencing and preserving the same; a gold medal.

20. For the second greatest number, (not less than ten thousand), in like manner; a silver medal.

21. For the third greatest number, (not less than ten thousand), a silver medal.—Certificates of such planting must be

be delivered on or before the last Tuesday in January, 1766.

N. B. Not less than one acre to be planted in any one inclosure, and they must be planted not nearer to each other than four feet.

22. 23. 24. The like premiums, and on the same conditions, will be given for planting out Scots fir in the year 1766.—Certificates to be delivered on or before the last Tuesday in January, 1767; and to be specified in the certificates, at what distances they have planted them.

25. WEYMOUTH PINE. For planting out in the year 1765, at proper distances, the greatest number of White Pine, commonly called Lord Weymouth's Pine, or the New-England Pine, (being the properest sort for masts), not less than two thousand, to be four years old at least when planted out, and for effectually fencing and preserving the same; a gold medal.

26. For the second greatest number, a silver medal.

27. For the third greatest number, a silver Medal.—Certificates of such planting must be delivered on or before the last Tuesday in January, 1766.

28. 29. 30. 31. 32. 33. The like premiums will be given for planting out Lord Weymouth's Pine as above, in the year 1766, and also in the year 1767; and certificates thereof must be delivered on or before the last Tuesday in January, 1767; and for 1767, on or before the last Tuesday in January, 1768.

34. LUCERNE. For sowing or planting with lucerne the greatest number of acres (ten at least) upon ground well cultivated, and for keeping the same free from weeds for three years; and giving an account of the culture, soil, annual produce, and its effects on cattle fed with it; twenty pounds.

35. For the next greatest number, fifteen pounds.

36. For the next, ten pounds.—The certificates to be produced on or before the second Wednesday in December, 1767.

37. 38. 39. For sowing or planting with lucerne the greatest

greatest number of acres, (ten at least), upon ground well cultivated, and for keeping the same free from weeds ; and giving an account of the culture, soil, annual produce, and its effects on cattle fed with it ; twenty pounds.

For the next greatest number, (eight acres at least), fifteen pounds.

For the next, (six acres at least), ten pounds.—The certificates to be produced on or before the second Wednesday in December 1768 *.

40. CARROTS. For sowing the greatest number of acres (not less than ten) with carrots, for the feeding of cattle only ; giving an account of the soil, culture, time of taking up, produce, and their effects on cattle fed with them ; twenty pounds.

41. For the next greatest number, (not less than eight), fifteen pounds.

42. For the next, (not less than six), ten pounds.—The certificates to be produced on or before the first Tuesday in November 1766.

43. WHITE CLOVER-SEED. For the greatest quantity of white clover-seed raised in England, in the year 1765, (not less than four hundred pounds weight) ; twenty pounds.

44. For the second greatest quantity, (not less than three hundred pounds weight), fifteen pounds.

45. For the third greatest quantity, (not less than two hundred pounds weight), ten pounds.—The certificates to be produced on or before the second Wednesday in March 1766.

46. PARSNIPS. For sowing the greatest quantity of land (not less than ten acres) with parsnips, for the feeding of cattle only ; giving an account of the soil, culture, produce, and their effects on cattle fed with them ; twenty pounds.

47. For

* The lucerne may be raised either in Mr Rocque's method, as described in this work, in rows with intervals, or may be cultivated by transplantation, in claim of these premiums.

47. For the next greatest quantity of land, (not less than eight acres), fifteen pounds.

48. For the third greatest quantity of land, (not less than six acres), ten pounds.—The certificates to be produced on or before the first Tuesday in November 1766.

49. PARSLEY. For sowing the greatest quantity of land (not less than four acres) with parsley, for the feeding of sheep only; giving an account of the soil, culture, produce, and its effects on the sheep fed with it; twenty pounds.

50. For the next greatest quantity of land, (not less than three acres), fifteen pounds.

51. For the third ditto, (not less than two acres), ten pounds.—The certificates to be produced on or before the last Wednesday in February 1767.

52. BURNET. For the greatest quantity of land (not less than five acres) sown with burnet; twenty pounds.

53. For the next greatest quantity of land, (not less than four acres), fifteen pounds.

54. For the third greatest quantity of land, (not less than three acres), ten pounds.—Certificates to be produced on or before the second Tuesday in January 1766, for those that sow or plant burnet the preceding year.

55. For sowing or planting with burnet the greatest number of acres, (not less than ten), upon ground well cultivated, and for keeping the same free from weeds for two years; and giving an account of the culture, soil, annual produce, and its effects on cattle fed with it; twenty pounds.

56. For the next greatest number of acres, (not less than eight), fifteen pounds.

57. For the next greatest number of acres, (not less than six), ten pounds.—The certificates to be produced on or before the first Tuesday in December 1768.

N. B. All persons intending to cultivate burnet, may be supplied with the seed, and receive instructions for the culture of it, from Mr Rocque, of Walham-Green, near Fulham.

58. GRASS-SEEDS gathered by hand. For the greatest quantity (not less than one pound weight) of each of the following kinds of grass-seeds gathered clean from the fields, by the hand, when ripe, viz.

Vernal,	} Five Pounds.
Fine Bent.	
Meadow Foxtail,	
Sheep's Fescue,	
Crested Dog's-tail,	
Common Pea;	}

59. For the second greatest quantity of each, three guineas.

60. For the third greatest quantity of each, one guinea.
 — Certificates under the hands of the minister and church-wardens, or of two or more of the principal inhabitants of the parish, ascertaining the quantities gathered, together with a small sample of each kind of seed, certified as above to have been taken indifferently and unpicked out of the gross quantity gathered, with a few plants of each kind of grass, having the seed upon them as it grew; to be produced to the society on or before the first of December 1765.

Specimens of the grasses in seed are to be seen at the society's room in the Strand; and drawings of them in Mr Stillingfleet's Miscellaneous Tracts, and in Mr Mills's third volume of husbandry.

61. For the greatest quantities respectively of each of the above kinds of grass-seeds, gathered in like manner, in the year 1766, or produced, and clean saved from such seeds gathered in the year 1765, as shall be separately sown in drills, and kept clean from all mixtures of other grasses and weeds; ten pounds.—Certificates of such separate sowing in drills and weeding, together with such certificates and samples as are required for the year 1765, to be produced on or before the first of December 1766.

62. For the second greatest quantity, five pounds.

63. For the greatest quantity of land, not less than one acre, which shall be sown with any one of the above-mentioned sorts of grass-seeds unmixed, in the year 1767,
 the

the society will give a premium of twenty pounds for each quantity of land so sown; the sowing to be in drills for the convenience of keeping the grass from weeds.—Certificates signed as above, ascertaining the quantity of the land sown, the quality of the soil, that the seed was sown in drills, and clean hoed and weeded, to be produced to the society on or before the first of December, 1767.

N. B. The society will be ready to purchase such clean seeds of the above grasses as shall be brought to them between the first day of August and the first day of December in the year 1767, at prices to be ascertained in their publications for that year, and will distribute the same *gratis* among such members of the society as shall give in their names to the secretary between the first day of January and the first day of March in the year 1768.

64. The society will give to any nobleman or gentleman for the greatest quantity (not less than two pounds weight) of any of the following grass-seeds gathered clean by hand when ripe, in the year 1765, viz. Meadow fescue, yellow oat, and annual poa; and who in the year 1767 shall sow the greatest quantity of land (one acre at least) in drills with any of the above grass-seeds unmixed; a gold medal for each.

Certificates and certified samples, as required for the other grasses, to be produced to the society on or before the first of December 1765, with a few plants of the grass having the seed on them as it grew.

Certificates signed as above, ascertaining the quantity of land sown, the quality of the soil, and that the seed was sown in drills, hoed, and kept clear of weeds; the value of each grass to be compared with natural pastures on the like soils and situations with regard to quantity and quality, to be produced to the society on or before the first of December, 1767.

65. CULTURE OF WHEAT. It not being yet ascertained by sufficient trials, whether sowing in broad-cast or in drills, horse-hoeing the intervals, be the most proper method of cultivating wheat, the society will give to the
person

person who shall produce an account of the most profitable method of cultivating it, confirmed by experiments, in which a comparison must be made between the two methods, and an account must be given of the soils in which each method promises the best success; a gold medal.

66. RYE. The like premium will be given for an account of the most profitable method of cultivating rye as above.

67. OATS. Also for oats as above, the like premium.

68. BARLEY. And likewise for barley as above, the like premium.—The candidates must deliver in their accounts on or before the first Tuesday in December, 1767.

69. 70. 71. 72. 73. 74. 75. 76. 77. LUCERNE, SAINTFOIN, CARROTS, &c. The like premiums will be given, and on the same conditions, to the persons who shall produce the best accounts of the most profitable method of cultivating each of the following articles, viz. lucerne, saintfoin, carrots, parsnips, parsley, turneps, beans, peas, and tares or vetches.

N. B. The society expects that the places shall be specified where such experiments were made, and that the experiment in the broad-cast, and in the horse hoeing method, be made on the same kind of soil, and as contiguous as may be.

The premiums for the above-mentioned articles are extended to Scotland and Ireland, and also to the British colonies on the continent of North-America.

78. It not being yet ascertained by sufficient trials, whether sowing in broad-cast or in drills, horse-hoeing the intervals, be the most proper method of cultivating wheat, the society will give to the person who shall produce the most accurate account of experiments, with the success in each method, and a description of the soil in which each experiment has been made, a gold medal.

79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. The like premiums will be given for the like account of experiments

ments on each of the following articles, respectively, viz. rye, oats, barley, lucerne, saintfoin, carrots, parsnips, parsley, turneps, beans, peas, and tares or vetches.—The candidates must deliver in their accounts on or before the first Tuesday in December, 1767.

N. B. The society expects that the places shall be specified where such experiments were made; and that the experiment in the broad-cast, and in the horse-hoeing method, be in the same kind of soil, and as contiguous as may be.

The premiums for the above-mentioned articles are extended to Scotland and Ireland, and also to the British colonies on the continent of North-America.

91. JUNIPER BERRIES. For sowing with juniper berries the greatest quantity of land in England or Wales, (not less than six acres), before the first day of November, 1764, the same being properly fenced and secured; the sum of forty pounds.

92. For the second greatest quantity of land so sown, fenced and secured, (not less than four acres), the sum of thirty pounds.

93. For the third greatest quantity of land so sown, fenced, and secured, (not less than two acres), the sum of fifteen pounds.—Certificates under the hands of the minister and church-wardens of the parish, or of two or more of the principal inhabitants in the neighbourhood, that such land was so sown, and fenced or secured, as also that the juniper plants raised from such seed are actually growing, and in a thriving state at the time of the making such certificate, must be sent to the society on or before the second Wednesday in November, 1765.

N. B. It is expected that the berries be sown in drills, each drill at the distance of four feet from each other.

94. MADDER. The society do hereby certify, that they will give the sum of five pounds for every acre of land planted with madder, as far as one hundred acres, in England or Wales; but in case there should be claimants
for

for more than one hundred acres, then the sum of five hundred pounds to be divided amongst the claimants, in proportion for every acre of each respective claimant. It is required that the plants be of the growth of England or Wales, and that no less than twenty thousand plants be set on every acre. The time appointed for the planting of the sets, is to be from the thirty first of March, 1765, to the first of March, 1766. Proper certificates of all these conditions are to be sent to, and received by, the secretary of the Society, on or before the first Tuesday in November, 1766, inclusive; after which day no certificates or claimants will be allowed of.

N. B. Receipts of the purchase of the plants, if not of their own growth, as well as the above-mentioned certificates, are to be produced.

95. To the person who shall raise the greatest quantity of madder upon an acre, the quantity to be determined by the weight of the roots when taken up and cleaned; the candidates to give a particular account of their manner of culture; twenty pounds.—The certificates of the weight of the roots when cleaned, to be sent in on or before the first Wednesday in November, 1766.

96. WILD MADDER. To the person who shall plant and cultivate the greatest number of plants (not less than five hundred) of the wild ever-green madder, of which a great quantity grows in Devonshire; twenty pounds.—Certificates of the number of the plants, with twenty of the plants, to be sent to the society on or before the second Wednesday in November, 1766.

97. BEE-HIVES. To the person who shall be possessed of the greatest number of hives or boxes of his own raising, stocked with living bees, (not less than eighty), on the first of February, 1766; a gold medal.

98. For the second greatest number, (not less than sixty), a silver medal.

99. A premium of five pounds will be given to every person who shall have in his possession, on February the first, 1766, being his own property, any number of stocks
of

of living bees in hives or boxes, not less than thirty. But in case there should be above forty claimants, then the sum of two hundred pounds shall be distributed between the candidates in proportion to the number of claimants.—Certificates to be delivered in, on or before the first of March, 1766.

N. B. The same person cannot be claimant both for the honorary and pecuniary premiums. The choice is left to the candidate.

PRESERVING THE LIVES OF BEES. Whereas the usual method of saving the honey from stocks or hives is by destroying the bees; and whereas it is found by experience, that the honey and wax may be obtained and the bees preserved at the same time; by which much larger quantities of both wax and honey are collected;

100. The Society will give a sum, not exceeding two hundred pounds, for collecting wax, and preserving the lives of the bees, in the following proportion: To every person who shall collect from stocks of bees, his own property, within the year 1767, ten pounds of clean merchantable wax, without destroying the bees, leaving a sufficient quantity of honey for their winter-sustenance; five pounds. But in case there shall be above forty claimants, then the sum of two hundred pounds shall be distributed among the candidates, in proportion to the number of claimants.—Certificates of the quantity of wax, and of the bees in each stock being alive on the first of February, 1768, to be delivered on or before the first of March following.

N. B. A complete apparatus, for the purposes above mentioned, may be seen at the society's office in the Strand.

101. **DRILL-PLOUGH.** For the best drill-plough that shall drill, sow, and cover the corn or seed at the same time, being an improvement upon such drill-ploughs as are already known or in use; fifty pounds.—Certificates of the performance, describing the manner and distance of dropping the corn or seed, together with the plough itself, to be

be produced to the society on or before the last Tuesday in December, 1765.

N. B. The plough that obtains the premium, shall be the property of the society.

102. MACHINE FOR DRAINING LANDS. For a plough or machine, of the simplest construction, which shall, with the least force, cut a new drain one foot in depth perpendicular, one foot eight inches wide at the top, and ten inches at bottom; both sides of the drain equally sloping, and the earth to be equally thrown out on both sides; fifty guineas.—Certificates of the machine having performed the work agreeable to the terms of the advertisement, must be delivered in, together with a model, on or before the first Wednesday in December, 1765.

103. The like premium, and on the same conditions, will be given for a machine for draining land in the year 1766.—The certificates to be delivered in, together with a model, on or before the first Wednesday in December, 1766.

T H E E N D.



